FURUKAWA

User's Manual

GEPON CHASSIS FK-C16

FURUKAWA INDUSTRIAL S.A Produtos Elétricos
Rua Hasbrubal Bellegard, 820 - Cidade Industrial CEP: 81460-120 - Curitiba - PR - Brasil

CENTRAL DE SERVICIOS AL CLIENTE
www.furukawa.com.br

TABLE OF CONTENTS

CHAPTER 1 INTRODUCTION 7

1-1 Overview 7
1-2 Model Description 7
1-3 Checklist 8
1-4 View of The Converter Chassis 8

CHAPTER 2 INSTALLATION 9

2-1 Management Board LED Indicator and Reset Switch 9
2-1-1 Power Module LED Indicator 11
2-2 Floor and Site Planning 11
2-3 Installation 12
2-3-1 Installing Converter Chassis to a 19-Inch Wiring Closet Rail 12
2-3-2 Installing Management Board to a Converter Chassis 12
2-3-3 Installing OLT Converter Modules to a Converter Chassis 13
2-3-4 Installing PC Station for Web-Based, In-Band Management 14
2-3-5 Installing a Terminal Emulator for CLI Management 15
2-4 Maintenance and Replacement 16
2-4-1 Power Unit Replacement 16
2-4-2 Converter Module Replacement 17
2-4-3 Management Board Module Replacement 18
2-4-4 High Speed Fan 19

CHAPTER 3 WEB-BASED MANAGEMENT 20

3-1 Web-Based Management, In-Band Management 20
3-1-1 Login 20
3-2 OLT 22
3-2-1 OLT VIEW 22
3-2-2 Port Config 25
3-2-3 OLT Statistics 26
3-2-4 OLT Information 27
3-2-5 OLT Traffic Mgmt 29
3-2-6 OLT Dynamic Bandwidth Allocation (DBA) 31

3-2-7 OLT IGMP Proxy 37
3-2-8 Network Parameters 46
3-2-9 OLT Operations 47
3-2-10 Advanced Bridging Config 49
3-2-11 OLT Block Link List 52
3-2-12 OLT All known Links 53
3-2-13 ONU List 54
3-2-14 ONU Authorization 55
3-2-15 ONU Preprovision 58
3-2-16 OLT Redundant 59
3-2-17 OLT Provision Wizard 62
3-3 ONU 63
3-3-1 ONU Subscriber View 63
3-3-2 Port Config 66
3-3-3 ONU Statistics 68
3-3-4 ONU Information 69
3-3-5 ONU Traffic Management 71
3-3-6 ONU IGMP Snooping 80
3-3-7 ONU Bridging Configuration 85
3-3-8 ONU Misc Operations 89
3-3-9 Loopback Test 91
3-3-10 ONU Provision Wizard 93
3-4 Logical Link 94
3-4-1 Logical Link List 94
3-4-2 SLA (Service Level Agreement) 95
3-4-3 Multicast SLA 97
3-4-4 Bridge Mode Setting 99
3-4-5 EPON Security 103
3-4-6 Link Statistics 104
3-4-7 Link Operation 105
3-5 System 106
3-5-1 System Information 106
3-5-2 IP Configuration 109
3-5-3 System Time Configuration 112
3-5-4 Account Configuration 115
3-6 SNMP Configuration 116

CENTRAL DE SERVIÇOS AO CLIENTE
0800 412100

3-7 Alarm 118
3-7-1 Events Configuration 118
3-7-2 Email Configuration 122
3-8 Soak Time Configuration 123
3-9 Configuration 124
3-9-1 Save/Restore 124
3-9-2 Configure Export / Import File Path 125
3-9-3 Host/OLT/ONU Export Config Backup 127
3-10 Diagnostic 128
3-10-1 Diagnostic 128
3-10-2 Ping Test 128
3-11 TFTP Server 129
3-12 Log Data 130
3-13 EPON Log File 132
3-14 Firmware Upgrade 134
3-14-1 Host Firmware Upgrade 134
3-14-2 OLT Upgrade 135
3-14-3 ONU Upgrade 136
3-15 Reboot 137
3-15-1 OLT Reboot Time 138
3-16 Logout 139

CHAPTER 4 CLI MANAGEMENT 140

4-1 CLI Management 140
4-1-1 Login 140
4-2 Commands of CLI 142
4-2-1 Global Commands of CLI 143
4-2-2 EPON Global Commands of CLI 151
4-2-3 EPON Management Command of CLI 155

APPENDIX A- EPON TECHNICAL SPECIFICATION 309

A-1 ONU Data Path Configuration 309
A-1-1 Overview 309
A-1-2 Filtering, Classification, and Access Control 309
A-1-3 ONU L2/L3/L4 Field Selector 313
A-1-4 ONU Rule Setting Concept 319

A-1-5 ONU Bad Rule Example *321*
A-2 BRIDGING 322
A-2-1 Introduction *322*
A-2-2 MAC Address Learning *322*
A-2-3 ONU MAC Address Learning *323*
A-2-4 OLT MAC Address Learning *324*
A-2-5 Legacy Bridging Modes *324*
A-2-6 Bridge Mode Setting *325*
A-3 EPON DATA TRAFFIC ENCRYPTION 337
A-4 IP MULTICAST ON EPON 338
A-4-1 IGMP Snooping and Proxying *338*
A-4-2 OLT IGMP PROXY *339*
A-4-3 ONU IGMP Snooping *341*
A-4-4 IGMP CAC *343*
A-4-5 FIFO selection and shaping *344*
A-5 SLA & DBA 345

APPENDIX B - TECHNICAL SPECIFICATION 354

APPENDIX C - RS-232 SERIAL CABLE SPECIFICATION 356

CENTRAL DE SERVIÇOS AO CLIENTE
0800 412100

Caution

Circuit devices are sensitive to static electricity, which can damage their delicate electronics. Dry weather conditions or walking across a carpeted floor may cause you to acquire a static electrical charge.

To protect your device, always:

- Touch the metal chassis of your computer to ground the static electrical charge before you pick up the circuit device.
- Pick up the device by holding it on the left and right edges only.

Electronic Emission Notices

Federal Communications Commission (FCC) Statement

This equipment has been tested and found to comply with the limits for a class A computing device pursuant to Subpart J of part 15 of FCC Rules, which are designed to provide reasonable protection against such interference when operated in a commercial environment.

European Community (CE) Electromagnetic Compatibility Directive

This equipment has been tested and found to comply with the protection requirements of European Emission Standard EN55022/EN60555-2 and the Generic European Immunity Standard EN50082-1.

EMC:	EN55022(1988) /CISPR-22(1985)	class A
	EN60555-2(1995)	class A
	EN60555-3	
	IEC1000-4-2(1995)	4k V CD, 8kV, AD
	IEC1000-4-3(1995)	3V/m
	IEC1000-4-4(1995)	1kV – (power line), 0.5kV – (signal line)

Chapter 1 Introduction

1-1 Overview

The intelligent box is a 19-inch EPON Media Converter Chassis with cabinet height 3U(5.20 inches). It is designed to accommodate 16 slots of various type of EPON fiber media converter module at a central location for multiple segments cross connection and network management. Any combination of EPON Fiber conversion solutions can be installed in a wiring closet for cable connection. The network management supports Web UI via browser, CLI via local console, Telnet interface and SNMPv2c. Supports IEEE 802.3ah OAM function for CO and CPE site "Remote Failure Indication", "Remote Loopback" and "Link Monitoring". Supports "Port Configuration" and "Bandwidth Configuration". Models equipped with DC—48V power unit are also available for Telecom applications.

Network management:

Built-in management board
Two 10/100 NWay Ethernet Port
One RS-232 port as local console
SNMP agent:
MIB-2 (RFC 1213)
Private MIB
Web browser support based on HTTP server
Telnet remote control CLI
TFTP software upgrade capability

1-2 Model Description

Model	Power Supply Configuration	DC Output	Slots
FK-C16-RAC	Two AC 100/240V Power Module w/ Redundancy	400W @+12V (200W each PS)	16

Table 1-1

Notes:

- Each slot is equipped with a dummy panel as factory default
- This chassis is compatible with the following modules/devices which are purchased in separate
  - GEPON OLT Card Furukawa model FK-OLT-20 - installed on chassis slots (up to 16 cards per chassis)
  - GEPON ONU Furukawa models FK-ONU-10 (10km) and FK-ONU-20 (20km) – CPE device

CENTRAL DE SERVIÇOS AO CLIENTE
0800 412100

1-3 Checklist

Before you start installing the Converter Chassis, verify that the package contains the following:

- 16-Slot GEPON Chassis
- Mounting Accessory (for 19" Rack Shelf)
- This User's Manual CD-ROM
- RS-232 Serial Cable (1pc)
- AC power cord (2 pcs)

Please notify your sales representative immediately if any of the aforementioned items is missing or damaged.

1-4 View of The Converter Chassis

Fig. 1-1 Front View of 19-inch Converter Chassis Rack

Fig. 1-2 Rear View of 19-inch Converter Chassis Rack

Chapter 2 Installation

2-1 Management Board LED Indicator and Reset Switch

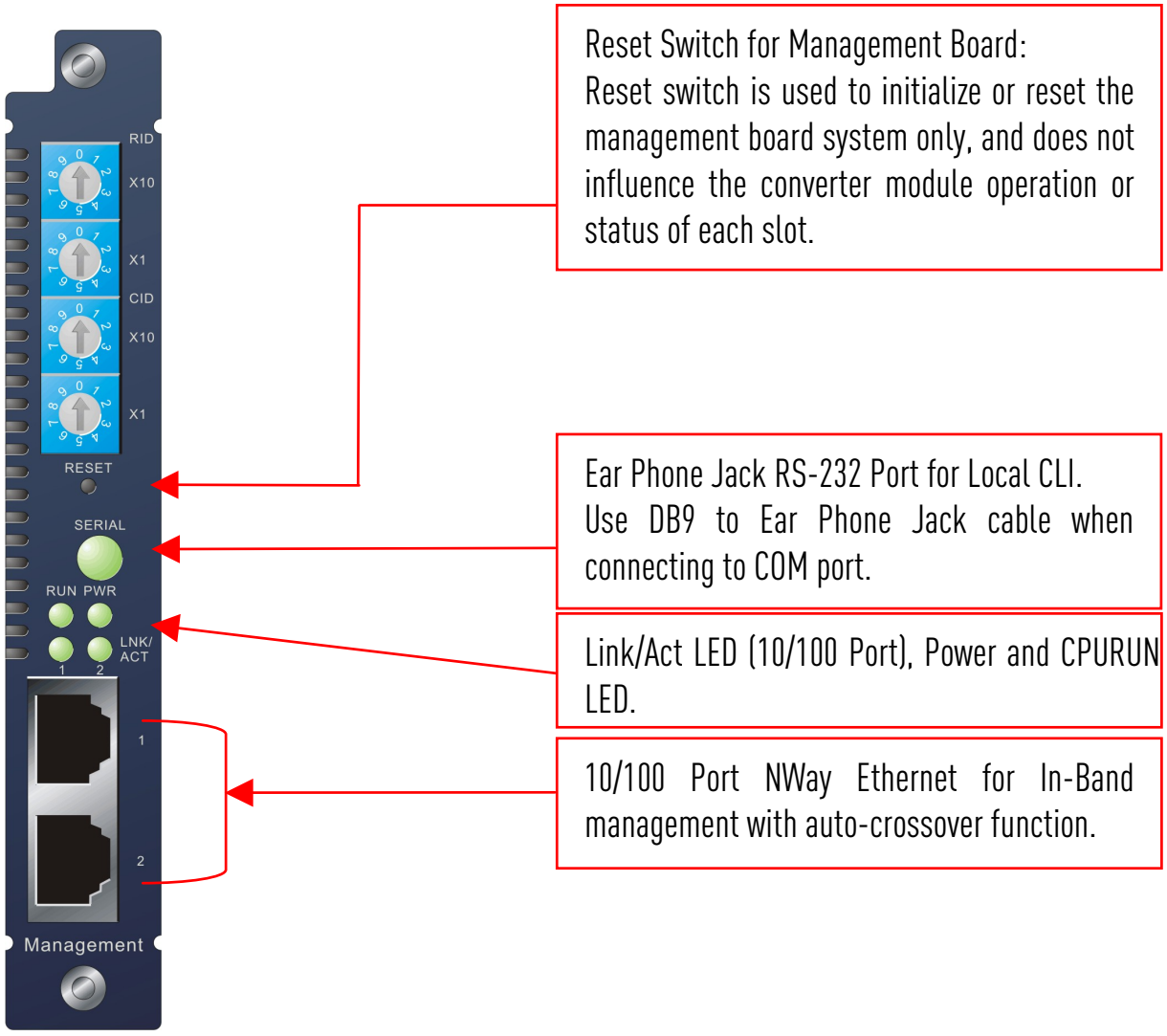


Fig. 2-1 Front View of Management Board and Connector

Note: Port 1~2 is mainly used in daisy chain for each FK-C16 chassis, the switch/hub could be saved to connect each chassis when the user would like to manage a variety of chassis mounted on the 19-inch rack in one network.

CENTRAL DE SERVIÇOS AO CLIENTE
0800 412100

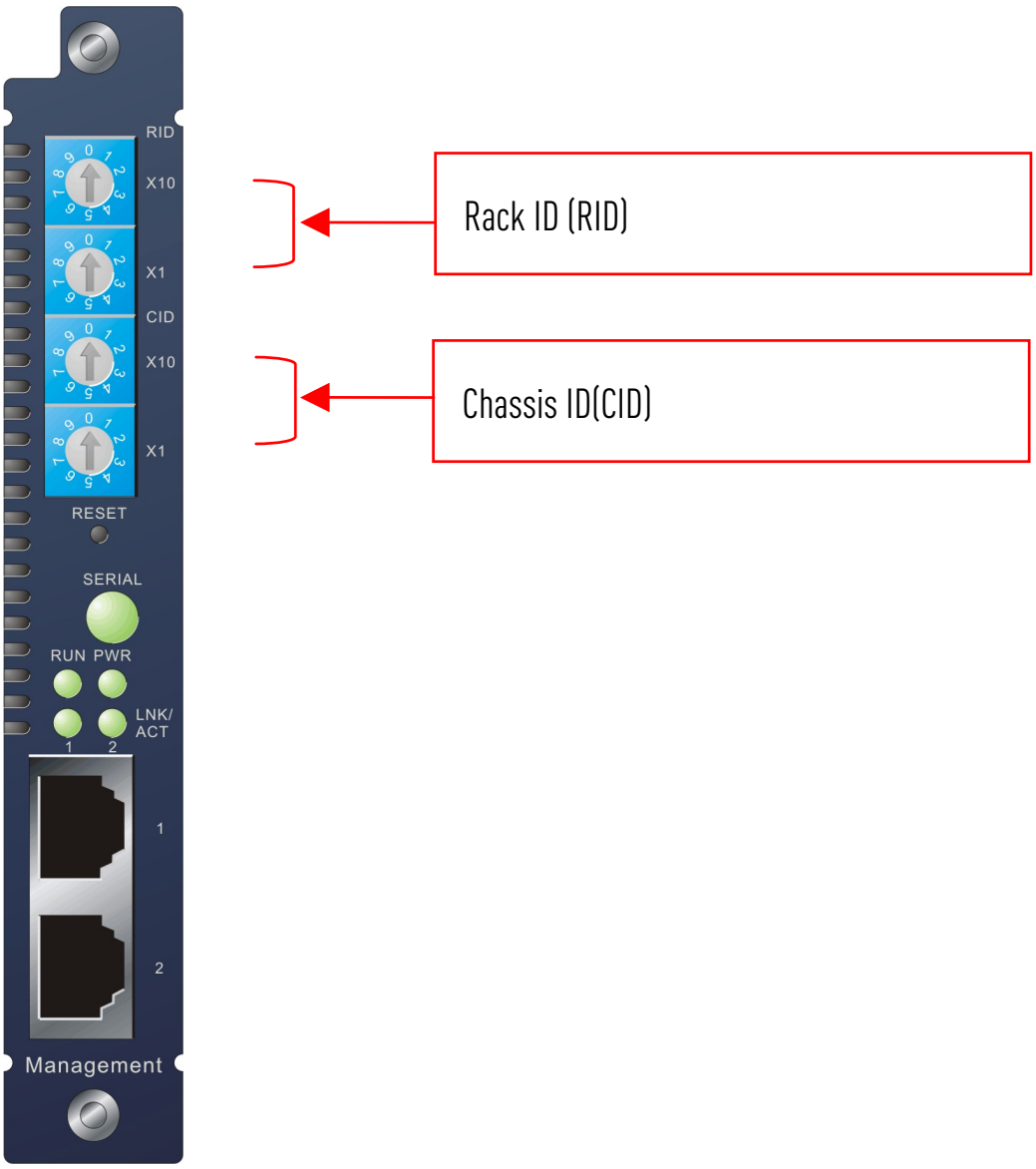
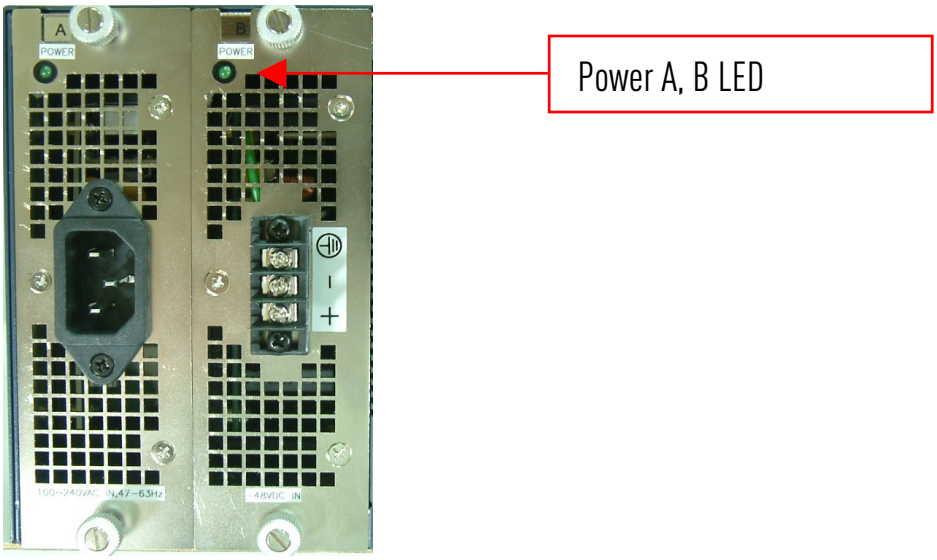


Fig. 2-2 Front View of Rack ID and Chassis ID

Note: FK-C16 supports two sets of switch number for the chassis location definition, one is RID (Rack ID), and the other is CID (Chassis ID). The former means the place in which the chassis was mounted in the Rack ID cabinet. The later means the chassis's number in the same rack cabinet. The RID and CID should be encoded when mounting the chassis into rack cabinet according to telecomm room rack cabinet number.

2-1-1 Power Module LED Indicator



LED	Color	Function
Power	Green	Lit when power is good
CPURUN	Green	Lit when CPU is active
LED for 10/100Mbps NWay Ethernet Port		
Link/Act	Green	Lit when connection with remote device is good Blinks when any traffic is present
LED for Redundant Power Unit A and Unit B		
A	Green	Lit when power unit A is good Blinks when power unit A failed
B	Green	Lit when power unit B is good Blinks when power unit B failed
LED A and B are steady lit when power redundancy takes effect with both A and B at power-good status. It goes to simplex power (no redundancy) when either power unit A or B failed with LED blinking. Unit A and unit B are hot-swappable.		

Table 2-1 LED Indicators Description and Status

2-2 Floor and Site Planning

16-Slot Intelligent Converter Chassis is designed in compliance with the EIA 310-D standards, and the chassis cabinet height is 3U(5.2 inches). The power consumption of 16 modules (maximum loading) is up to 200 Watts.

CENTRAL DE SERVIÇOS AO CLIENTE
0800 412100

Sufficient air ventilation and good environment are necessary to assure proper converter chassis operation. Consider the proper spacing between the manageable chassis and adjacent facility when mounting the manageable chassis to the 19-inch rails.

2-3 Installation

2-3-1 Installing Converter Chassis to a 19-Inch Wiring Closet Rail

Caution: Allow a proper spacing for the air intake at the bottom side, and proper air ventilation for the cooling fan at the rear side of converter chassis.

- Wear a grounding device for electrostatic discharge
- Install four screws through mounting ears into each side
- Locate Converter Chassis at 19-inch mounting rails and screw up the front brackets
- Set power cord after power module inserted into the 16-slot chassis ready (for redundant power model, each power unit has a separate power cord)
- Verify that the voltage of AC power is correct and plug in AC power cord

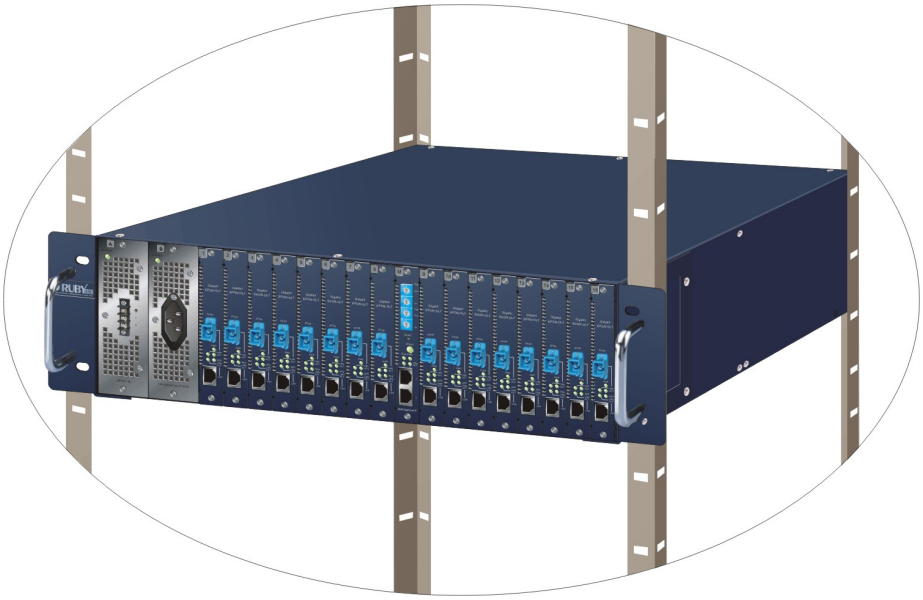


Fig. 2-4 Installing Converter Chassis in 19-inch Wiring Closet Rails

2-3-2 Installing Management Board to a Converter Chassis

Note: Management board must be inserted in to slot M, it is hot-swappable.

- Wear a grounding device for electrostatic discharge
- Unscrew and remove the vacant slot M dummy panel

- Verify the management board is the right model and conforms to the chassis
- Slide the management board along two guides in slot and fasten the thumb knob, and be sure that the converter module is properly seated against the slot socket/connector
- Install the media cable for network connection for converter chassis management

2-3-3 Installing OLT Converter Modules to a Converter Chassis

Note: Converter slide-in modules are hot-swappable.

- Wear a grounding device for electrostatic discharge
- Unscrew and remove the vacant slot dummy panel
- Verify the converter module is the right model and conforms to the chassis
- Slide the module along two guides in slot and fasten the thumb knob, and be sure that the converter module is properly seated against the slot socket/connector
- Install the media cable for network connection
- Repeat the above steps, as needed, for each module to be installed into slot(s)

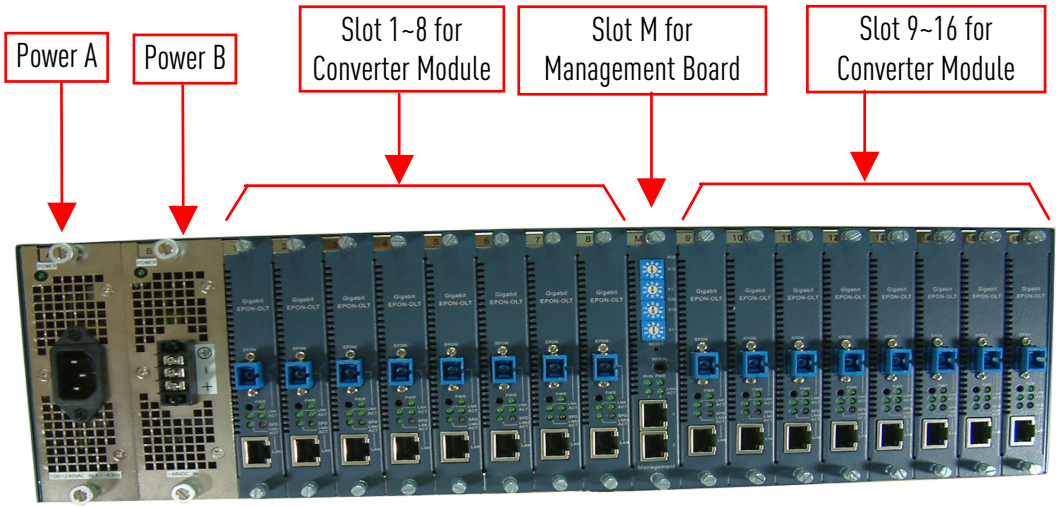
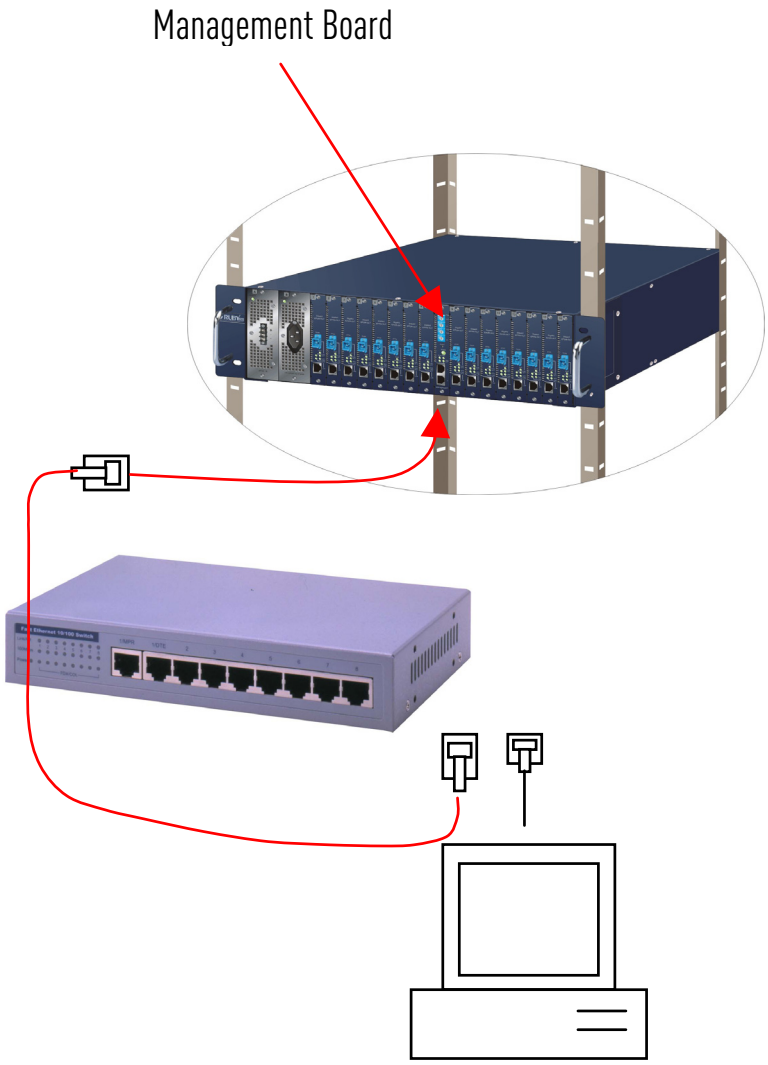


Fig. 2-5 Installing All Module into the 16-slot Converter Chassis

CENTRAL DE SERVIÇOS AO CLIENTE
0800 412100

2-3-4 Installing PC Station for Web-Based, In-Band Management

The converter chassis management board provides embedded Web server, SNMP agent, TFTP client and Telnet software, etc. that can be used at a remote PC with any installed Web browser, SNMP, TFTP or Telnet application to do network management.



10/100 TP port connects to Ethernet switch/network for In-Band management
Management Board Default IP Setting:
IP = 192.168.1.1
Subnet Mask = 255.255.255.0
Default Gateway = 192.168.1.254

PC Web/SNMP Station equips with a 10/100 LAN board and connects to Ethernet switch. Assign a unique IP address for PC station.
For example:
IP = 192.168.1.146
Subnet Mask = 255.255.255.0
Default Gateway = 192.168.1.254

Fig. 2-6 In-Band Management by Ethernet Switch/Network and PC

Warning: Both management board and PC/station's IP must be in a subnet, please assign a proper Subnet Mask.

To connect the Web/SNMP Management module to the remote Network Management Station:

1. Locate CAT. 5e UTP (or up) network cable with male RJ-45 connector. Attach male RJ-45 connector to Media Converter Rack Management Module. Attach the other end of cable to an Ethernet switch.
2. Locate the second network cable. Attach the second network cable to the Ethernet Switch.
3. Attach the other end of cable to the PC Network Management Station.
4. To assign a reasonable public or private IP address depends on each network site. Please refer to Figure 2-7 about the Converter Chassis Management board's default IP address information. Also refer to Section 3-1-7-3 or Section 4-2-2 " IP Configuration" for the management board's IP address setting.

2-3-5 Installing a Terminal Emulator for CLI Management

The serial port cable is attached directly to a DTE device through a null modem cable for CLI management. The null modem cable configuration is attached on Appendix C.

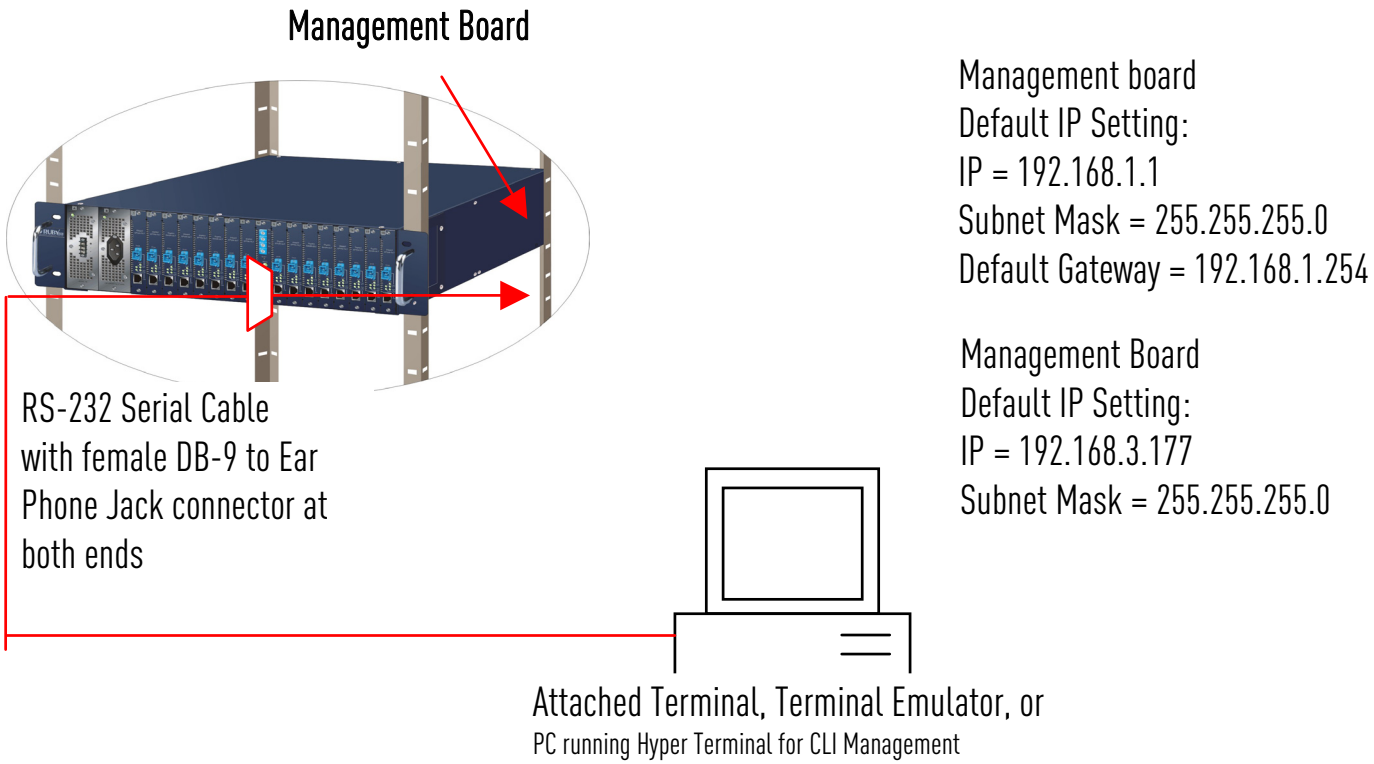


Fig. 2-7 Local Console Management by PC Hyper Terminal and Com Port

CENTRAL DE SERVIÇOS AO CLIENTE
0800 412100

To connect the Management board to the CLI interface:

1. Locate the correct DB-9 serial port null modem cable with female DB-9 connector. Refer to the Appendix C for null modem cable configuration. Null modem cable comes with the management chassis.
2. Attach the DB-9 serial port female cable connector to the male DB-9 serial port connector on the Converter Chassis Management board.
3. Attach the other end of the DB-9 serial port cable to an ASCII terminal emulator. For example, Windows98's HyperTerminal utility.
   Note: The Management board uses the following serial port parameter values:

Baud rate	57600
Stop bits	1
Data bits	8
Parity	N
Flow control	none

4. When the terminal emulator connected the management board, then press **<Enter>**key, the Login prompt will be shown on the screen. The default username and password are shown as below:
   Username = admin Password = admin
5. Refer to Chapter 4 "CLI Management" for more details.

2-4 Maintenance and Replacement

2-4-1 Power Unit Replacement

Note: For redundant power model, the power unit LED will blink when power unit failed.

Wear a grounding device for electrostatic discharge

- Remove power cord from power connector (AC socket / DC terminal block)
- Unscrew the power unit
- Remove the defective power unit
- Slide-in the replacement power unit along the guide rails
- Install and fasten the power unit
- Install power cord onto power connector

Fig. 2-8 Power Unit Replacement

2-4-2 Converter Module Replacement

Note: Converter slide-in modules are hot-swappable

- Wear a grounding device for electrostatic discharge
- Unscrew the thumb knob of the converter module
- Remove the defective converter module
- Slide the replacement converter module along two guides in slot
- Fasten the thumb knob, and be sure that the converter module is properly seated against the slot socket/connector

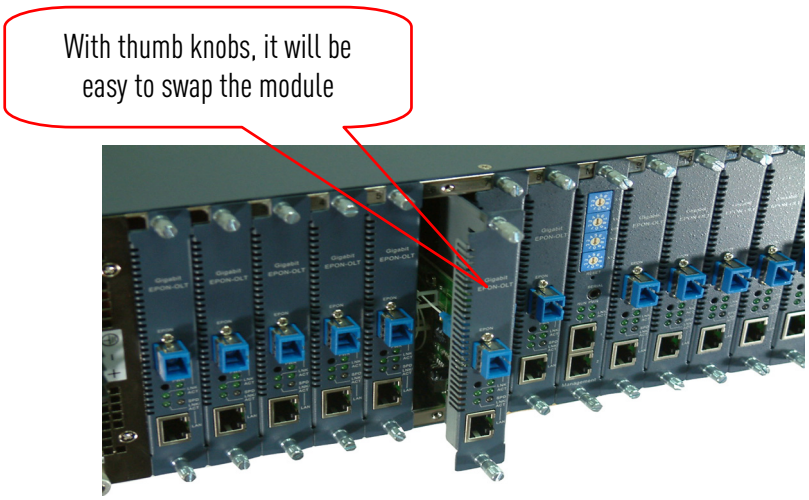


Fig. 2-9 Converter Module Replacement

CENTRAL DE SERVIÇOS AO CLIENTE
0800 412100

2-4-3 Management Board Module Replacement

Note: Management Board module is hot-swappable; only management functions were stopped at that time. All modules fiber conversion and forwarding function could be still run well.

- Wear a grounding device for electrostatic discharge
- After powering off the converter chassis, unscrew the thumb knob of the management board module
- Remove the defective management board module
- Slide the replacement management board module along two guides in slot
- Fasten the thumb knob, and be sure that the management board module is properly seated against the slot socket/connector
- After powering on the converter chassis, initialize the Management Board by pressing "Reset" button and go to the management menu

Note:

- Entire configuration of the FK-C16 chassis could be saved into a file via the function "Import Export Configuration". For more details, please refer to Section 3-1-10-5.
- Except IP address, all configurations about the new management board module will be recovered after above procedures.

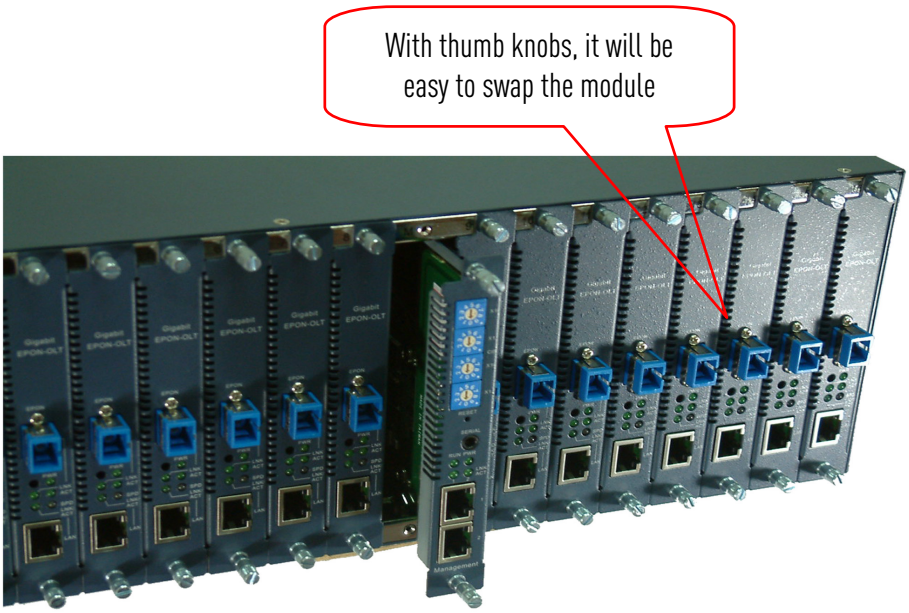


Fig. 2-10 Management Board Module Replacement

2-4-4 High Speed Fan

Attention: High Speed Fan Exchange! Please watch your own safety during swapping if the fan is still running.

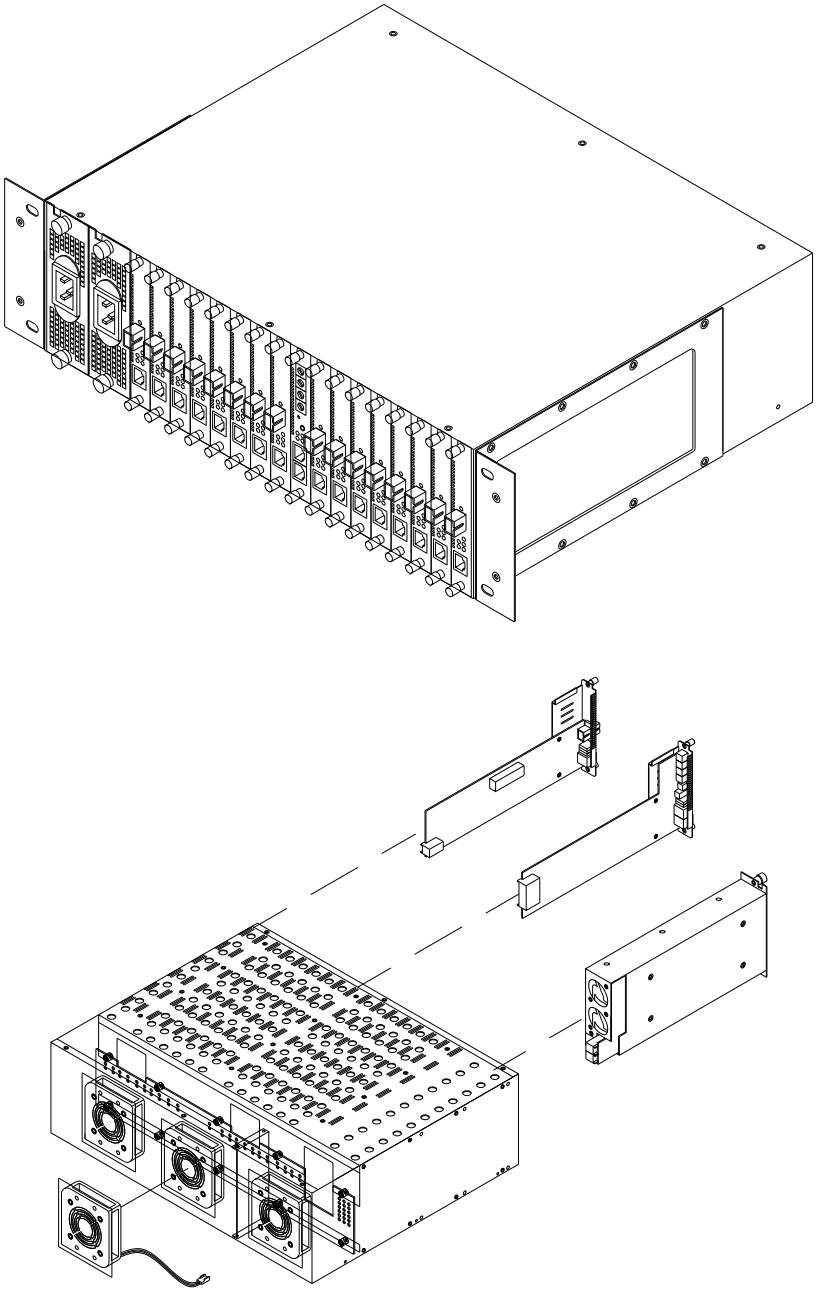


Fig. 2-11 High Speed Fan Replacement

CENTRAL DE SERVIÇOS AO CLIENTE
0800 412100

Chapter 3 Web-based Management

3-1 Web-Based Management, In-Band Management

Refer to Chapter 2 for basic installation. The following description is the brief of the network connection.

For Management Board: 10/100 TP port connects to Ethernet switch/network for In-Band management. Management Board Default IP Setting:

IP = 192.168.1.1
Subnet Mask = 255.255.255.0
Default Gateway = 192.168.1.254

For PC Web/SNMP Station: Install a 10/100 LAN board and connect to Ethernet switch. Assign a unique IP address, for example:

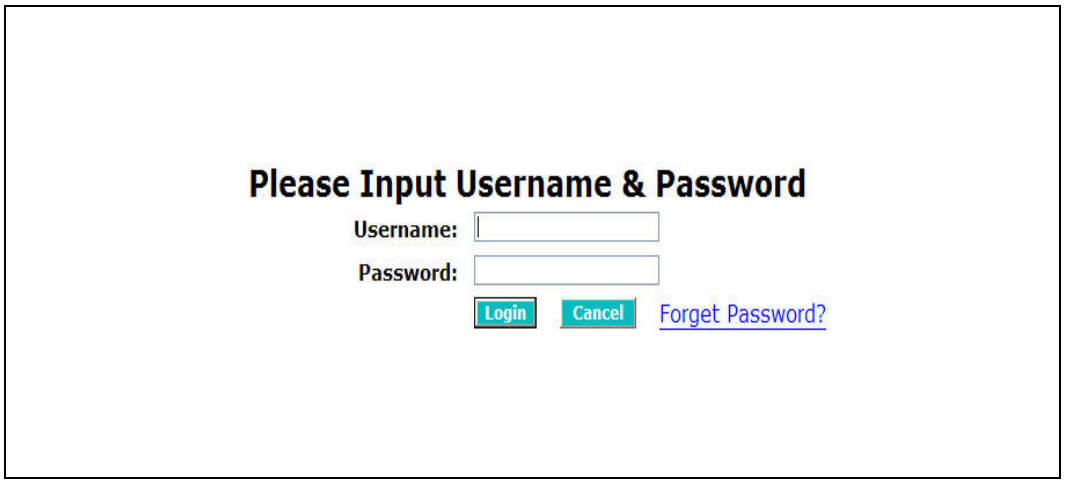
IP = 192.168.1.146
Subnet Mask = 255.255.255.0
Default Gateway = 192.168.1.254

Warning: Both PC/station and management boards' IP must be located in the same IP subnet, please assign a proper Subnet Mask.

3-1-1 Login

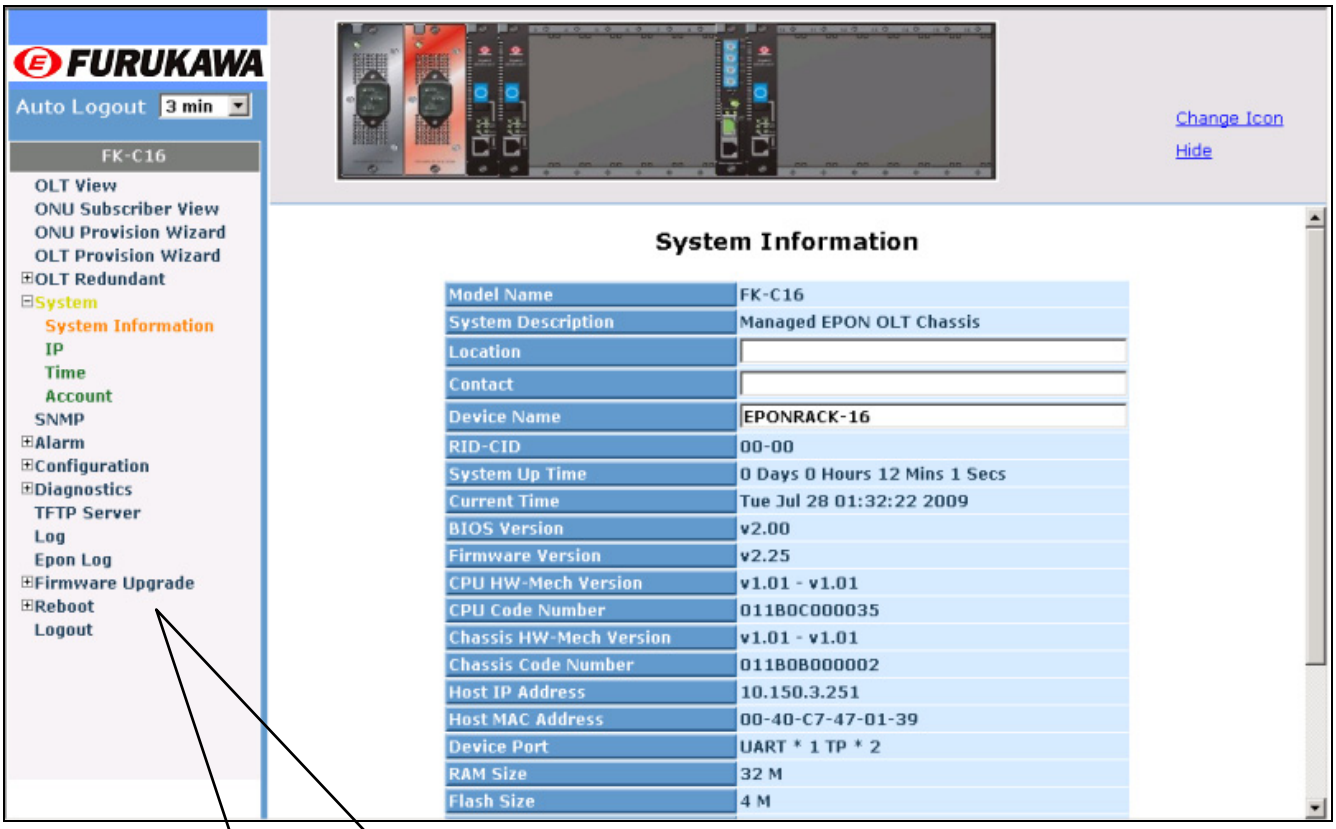
Run Internet IE Browser V4.0 or above, then go to http://192.168.1.1/

Default Username: **admin** Default Password: **admin**



Caution:

- If the default IP address (192.168.1.1) is not available, you can use CLI management's IP setting (refer to Chapter 2 and Chapter 4) to configure a suitable IP address for the management access.
- If the IP address conflict occurred, the "Login Menu" would not be accessed. The installer must resolve the IP address conflicts to access the "Login Menu".



The main function list will be displayed on the left side of the screen

CENTRAL DE SERVIÇOS AO CLIENTE
0800 412100

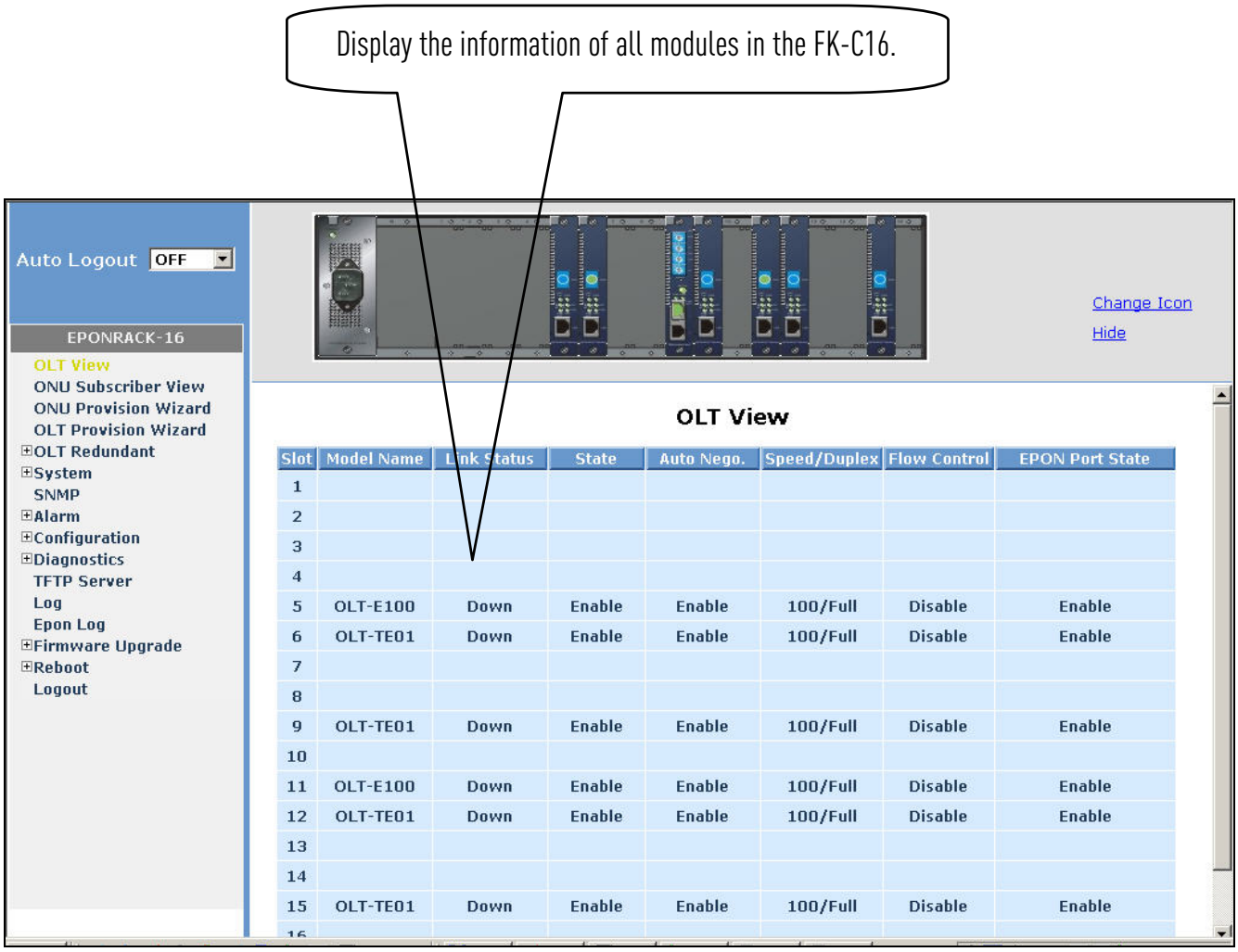
3-2 OLT

This CO site Chassis supports up to 16 OLT modules.The management functions about OLT modules are described in this section.

3-2-1 OLT VIEW

Function description:

The "OLT View" table displays model name and port status of all OLTs in the system (from slot 1 to slot 16). Click on a row in this table,the corresponding management function submenu of a specific OLT module will show up.



Parameter description:

Slot:

Slot Number of each row in this table. Slot 1 is the most left module slot of the physical chassis; slot 16 is the most right one. An empty row (a row without any status data) represents a slot without OLT plugged in.

Model Name:

The model name of the OLT module in a specific slot.

Link Status:

The physical link status of the CNI port of an OLT. Possible values are [Up] and [Down]. CNI is the abbreviation of "Core Network Interface". Other synonyms are "SNI","uplink port".

State:

The management status of the CNI port on an OLT. Possible values are [Enable] and [Disable].

Auto Nego.:

Auto Negotiation status of the CNI port on an OLT. Possible values are [Enable] and [Disable] .

Speed/Duplex:

Current line speed and duplex mode of the CNI port on an OLT. Possible values are [1000/Full][100/Full].

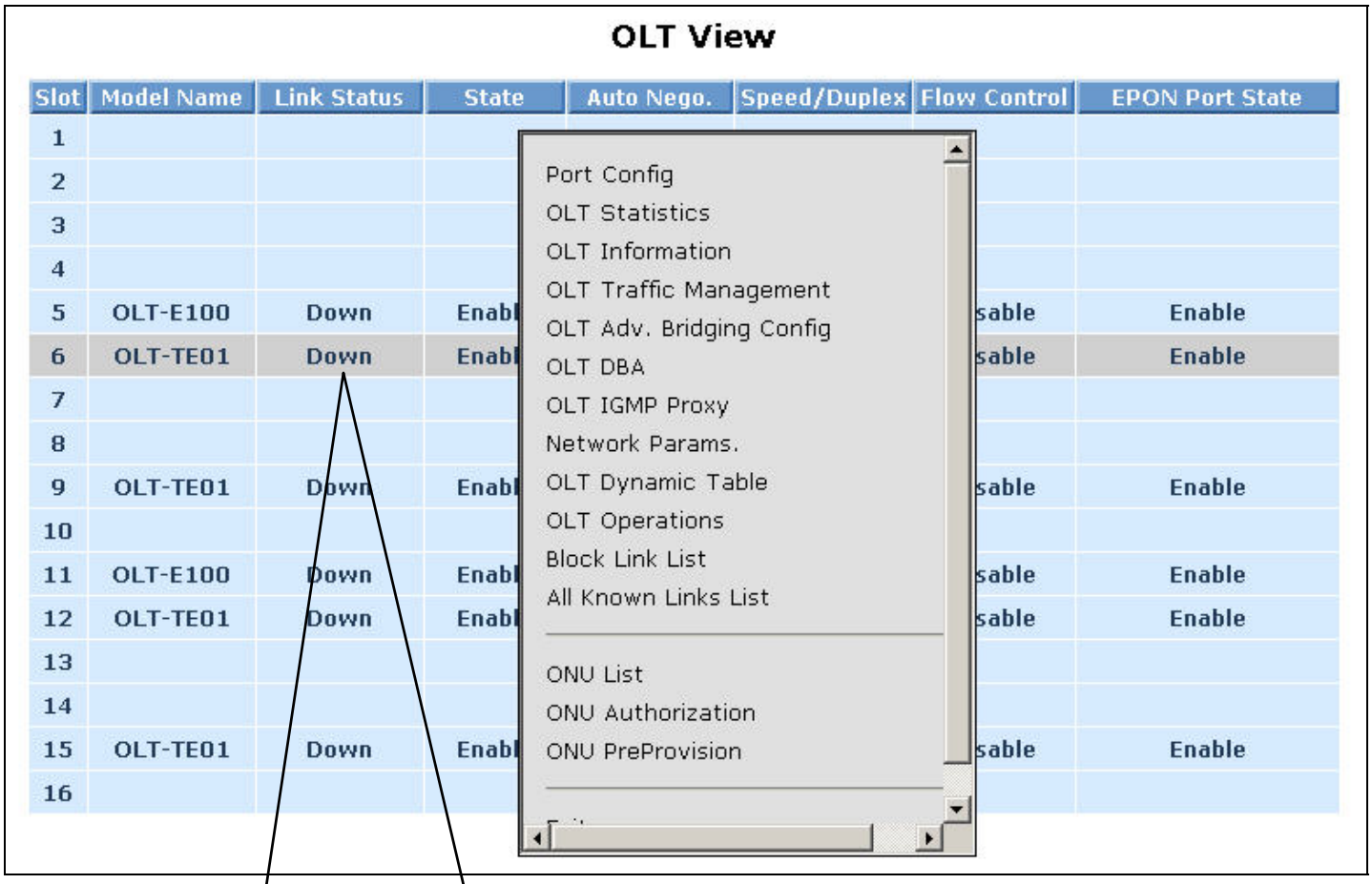
Flow Control:

IEEE802.3x Pause flow control state of the CNI port on an OLT. Possible values are [Enable] and [Disable] .

EPON Port State:

The management status of the EPON port on an OLT. Possible values are [Enable] and [Disable].

CENTRAL DE SERVIÇOS AO CLIENTE
0800 412100

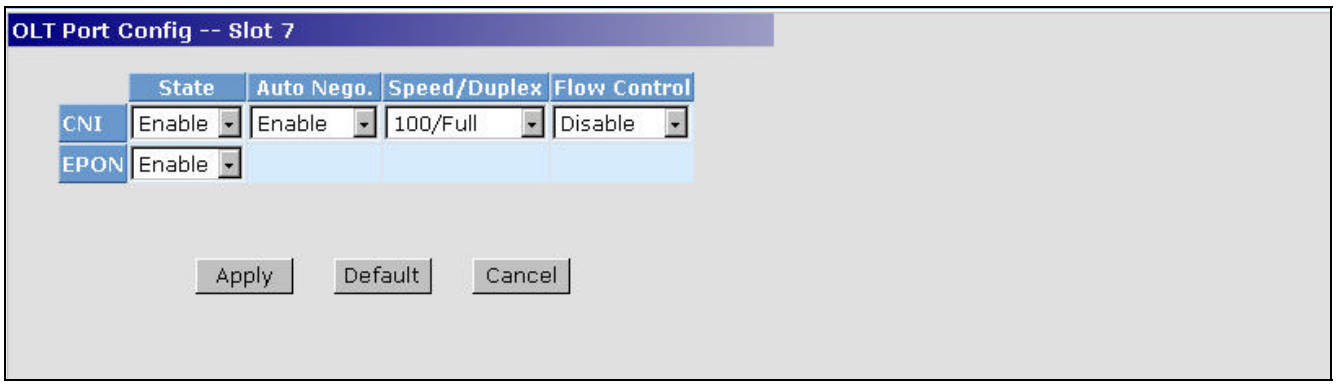


Click the slot module, and a selection list will be pop up. User can choose one of them to view or configure the setting for this module.

3-2-2 Port Config

Function description:

Configuration port settings for both CNI and EPON ports on an OLT. <Default> button would load the factory default settings to the dialogue box. Configuration values will take effect until <Apply> button is clicked.



Parameter description:

State:

To configure the management status of both CNI and Epon ports on an OLT. Possible values are [Enable] and [Disable].

Default: [Enable]

Auto Nego.:

To configure Auto Negotiation state of the CNI ports on an OLT. Possible values are [Enable] and [Disable]

Default: [Enable]

Speed/Duplex:

To configure line speed and duplex mode of the CNI ports on an OLT. Possible values are [1000/Full][100/Full].

Default: [1000/Full]

Flow Control:

To configure flow control state of the CNI port of an OLT. Possible values are [Enable] and [Disable]

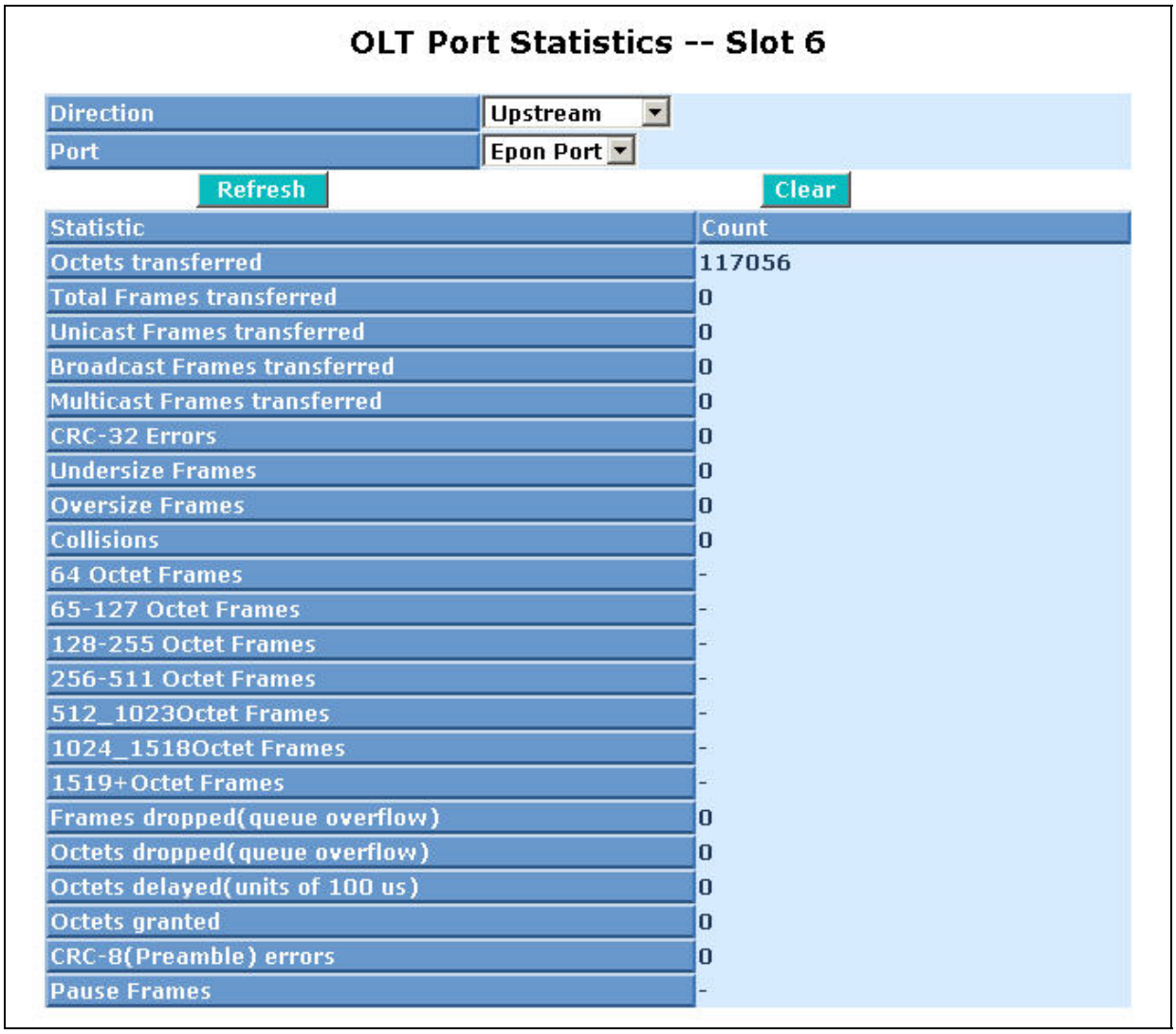
Default: [Disable]

CENTRAL DE SERVIÇOS AO CLIENTE
0800 412100

3-2-3 OLT Statistics

Function description:

Requests statistics related to the specified ports including Epon port and CNI port. The transferring direction supports upstream and downstream. If you click Refresh button, the statistics information will be displayed. If Clear button is clicked, the statistics information will be cleared. Upstream direction reflects the traffic from Epon port to CNI port. Downstream direction reflects the traffic from CNI port to Epon port.



OLT Port Statistics -- Slot 6

Direction	Upstream
Port	Epon Port

Refresh Clear

Statistic	Count
Octets transferred	117056
Total Frames transferred	0
Unicast Frames transferred	0
Broadcast Frames transferred	0
Multicast Frames transferred	0
CRC-32 Errors	0
Undersize Frames	0
Oversize Frames	0
Collisions	0
64 Octet Frames	-
65-127 Octet Frames	-
128-255 Octet Frames	-
256-511 Octet Frames	-
512_1023Octet Frames	-
1024_1518Octet Frames	-
1519+Octet Frames	-
Frames dropped(queue overflow)	0
Octets dropped(queue overflow)	0
Octets delayed(units of 100 us)	0
Octets granted	0
CRC-8(Preamble) errors	0
Pause Frames	-

3-2-4 OLT Information

Function description:

A detailed description about an OLT.

OLT Information -- Slot 5

Model Name	OLT-E100
Serial Number	011D02000018
Output Optical Center Wavelength (nm)	1490
Min. TX Power (dBm)	3.5
Max. TX Power (dBm)	7
Min. RX Operating Wavelength (nm)	1260
Max. RX Operating Wavelength (nm)	1360
RX Sensitivity (dBm)	-27
RX Saturation Power (dBm)	-6
Mac Address	00-40-c7-48-00-dc
Firmware Version	0x141
Chip ID	0x3721
Chip Version	0xa0040219
Boot Code Version	0xb842
Personality Version	f3
App0 Version	0x141
App1 Version	0x141

Parameter description:

OLT optical Transceiver information:

Output Optical Center Wavelength(nm)

Min. TX Power (dBm)

Max. TX Power (dBm)

Min. RX Operating Wavelength (nm)

Max. RX Operating Wavelength (nm)

RX Sensitivity (dBm)

RX Saturation Power (dBm)

OLT identity

CENTRAL DE SERVIÇOS AO CLIENTE
0800 412100

Mac Address:

The globally unique Mac Address of an OLT. The Mac Address is primarily used within an EPON system to identify the OLT.

Firmware Version:

The version number of the (app)firmware currently running on the OLT EPON chip.

Chip ID:

The EPON chip type of the OLT.

Chip Version:

The hardware version number of the EPON chip inside the OLT.

Boot Code Version:

The firmware version number of the bootstrap code residing in the OLT EPON chip.

Personality Version:

Personality is an area in the flash memory inside the OLT.This non-volatile memory keeps the most basic and default provisioning information of an OLT. When an OLT boots up,some provisioning information must be fetched from the personality area.

App0 Version:

App1 Version:

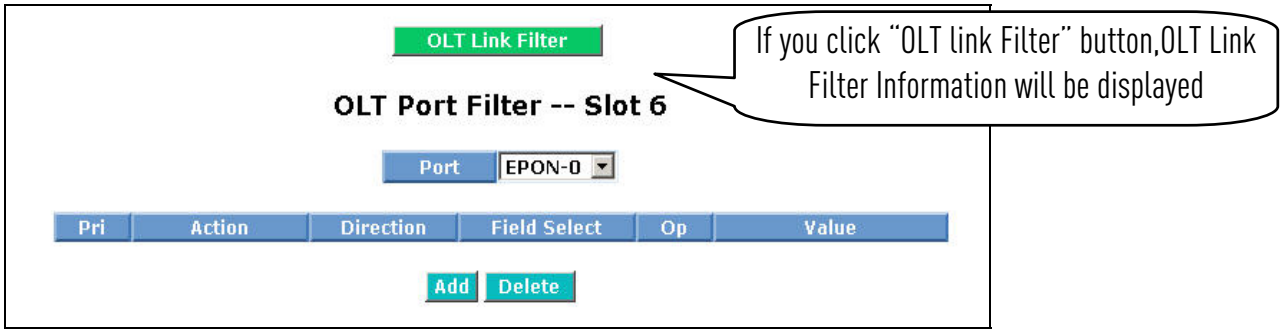
Two memory areas are allocated within the OLT flash for the redundant storing of the EPON application firmware. App0 is the primary one.If app0 is crashed and unable to be loaded, app1 will be the backup.When one application firmware load crashing is detected,the backup load will be automatically replicated to keep the redundancy.

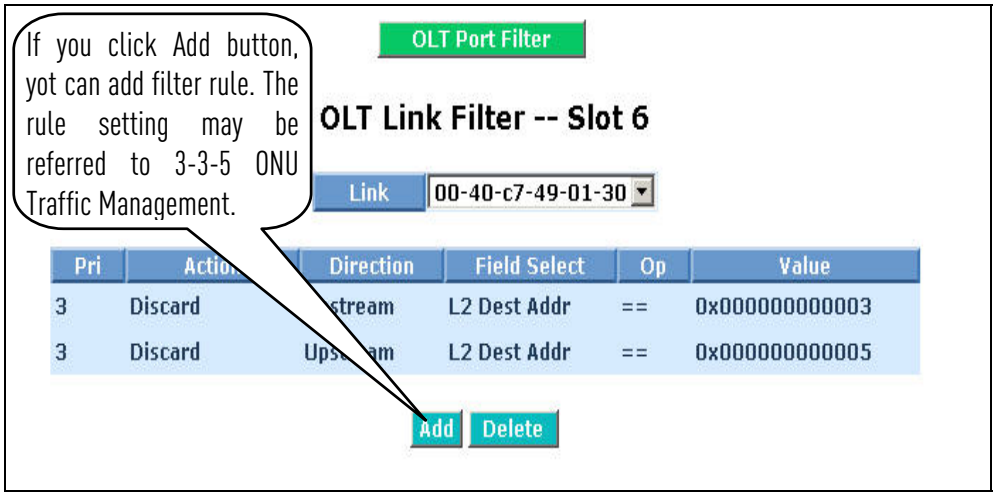
3-2-5 OLT Traffic Mgmt

3-2-5-1 OLT Filter

Function description:

Setting OLT Filter can add a new filter rule to the OLT. Deleting OLT Filter is the symmetrical operation used to remove an existing filter rule. Multiple filter conditions (clauses) may be specified in a single rule, in which case the conditions are considered to be logically ANDed together to determine how the rule takes effect. Rules that are specified using separate messages are considered to be logically ORed. A series of conditions ORed together would be specified as several independent filter rules with the same action for each. Rules are applied to frames in the upstream or the downstream direction, and a specified action is executed when a match occurs. A rule can match a field in a frame against a Lookup value with a given operator.
The Set and Delete OLT Filter command is used to set or delete a single filter rule. Multiple uses of the commands must be used to set or delete multiple filter rules. However the Get command will return all of the filter rules currently provisioned. While specifying an OLT Port Filter, the maximum number of clauses is 8. About specifying an OLT Link Label Filter, the maximum number of clauses is 7.



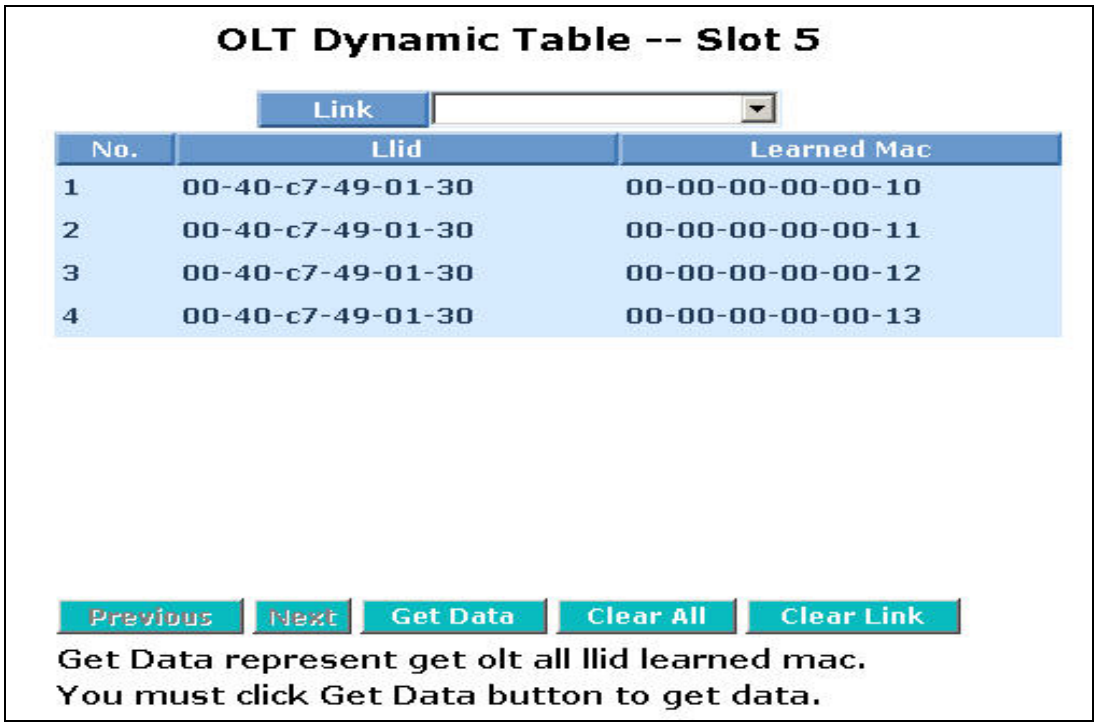


CENTRAL DE SERVIÇOS AO CLIENTE
0800 412100

3-2-5-2 OLT Dynamic Table

Function description:

Display the automatically learned MAC addresses for the selected Logical Link.
Clear Button can be used to clear the whole dynamic MAC table for all Logical Links.
Dynamic entries will be automatically removed if ANY of the following events should occur:
1. The link's SLAs are disabled or enabled
2. The bridging mode is changed
3. The link departs the network
4. Upstream SLA is modified such that link's priority changes (priority change requires a new link index to be registered for that logical link).



If dynamic entries exceed 256, It has two pages. You can click Next button to get next page entries. Each page has 256 entries.

3-2-6 OLT Dynamic Bandwidth Allocation (DBA)

Drop Down Weight, Broadcast SLA, Aggregate Shaper, Priority Range, and Polling Rate determine the operation of Dynamic Bandwidth Allocation (DBA). The DBA use a Weighted Hierarchical Round Robin scheduler (WHRR). It allows network operator to provision Service Level Agreements (SLAs) on per Logical Link ID (LLID) basic. Each SLA has the four parameters, Minimum Guaranteed Bandwidth (Min Bw), Maximum Allowable Bandwidth (Max Bw), Burst Size, and Delay Tolerance. On the system implements Aggregate Shaper, which ensures that the Maximum Allowable Bandwidth and Burst Size are not exceeded on a per SLA basis. The DBA uses queue length status received from ONU Report messages, along with the SLA parameters, to calculate bandwidth allocation. There are up to 3 levels of hierarchy support. Each LLID can maps to a priority level and it is serviced using Round Robin Scheduling. The priority level of the LLID is determined by its SLA. The 3 levels show as below. (Table 3-2-6-1)

Priority Level	Delay Sensitive	Min Bw / Max Bw
0 (high)	Sensitive	Max Bw = Min Bw
1 (medium)	Tolerant	Min Bw > 0
2 (low)	Tolerant	Min Bw = 0
Note: If the delay sensitive is "Sensitive", but the Min Bw and Max Bw are not the same, this setting is Invalid.		

Table 3-2-6-1 Priority Level

The DBA Scheduler depends on Drop Down weight to give next level total size.
For example:

- LLIDs of Level 0: 0 ~ 9 < token size: 2K / Drop Down Weight: 20K >
- LLIDs of Level 1: 10 ~ 20 < token size: 4K / Drop Down Weight: 20K >
- LLIDs of Level 2: 21 ~ 29 < token size: 8K >

The below diagram illustrates the DBA Scheduler.

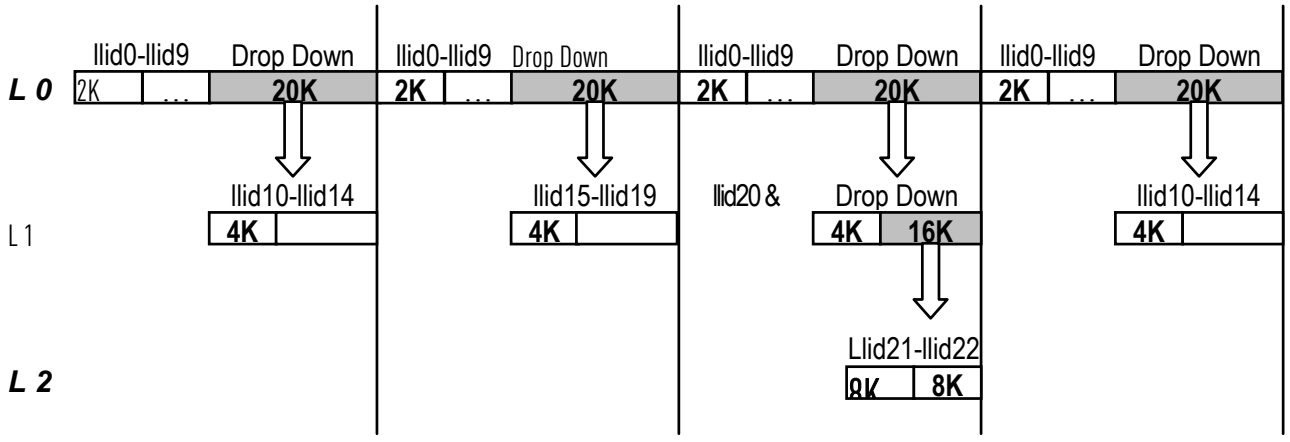
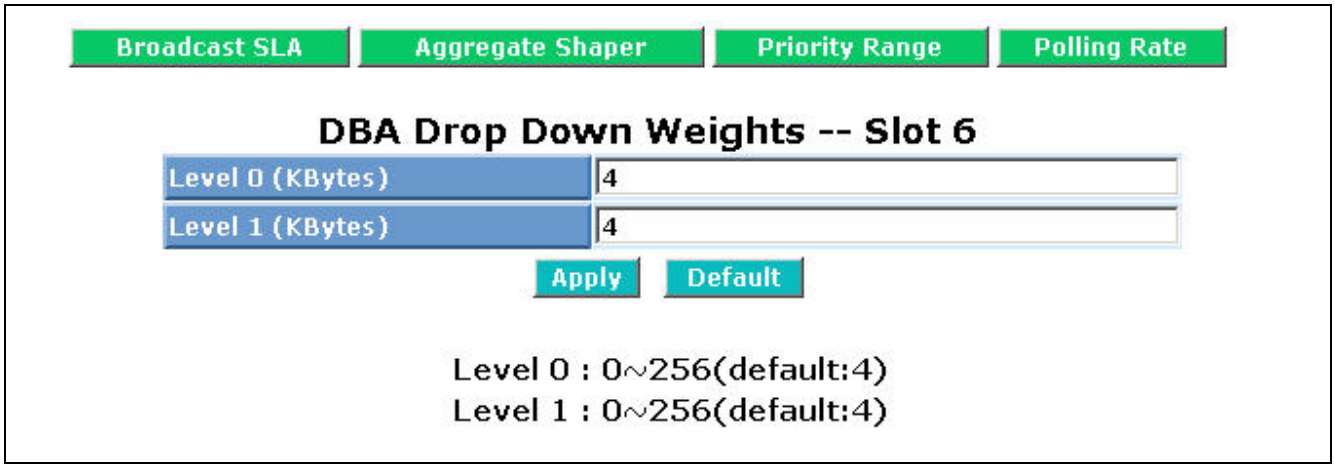


Figure 3-2-6-1 DBA Scheduler

CENTRAL DE SERVIÇOS AO CLIENTE
0800 412100

3-2-6-1 DBA Drop Down Weight

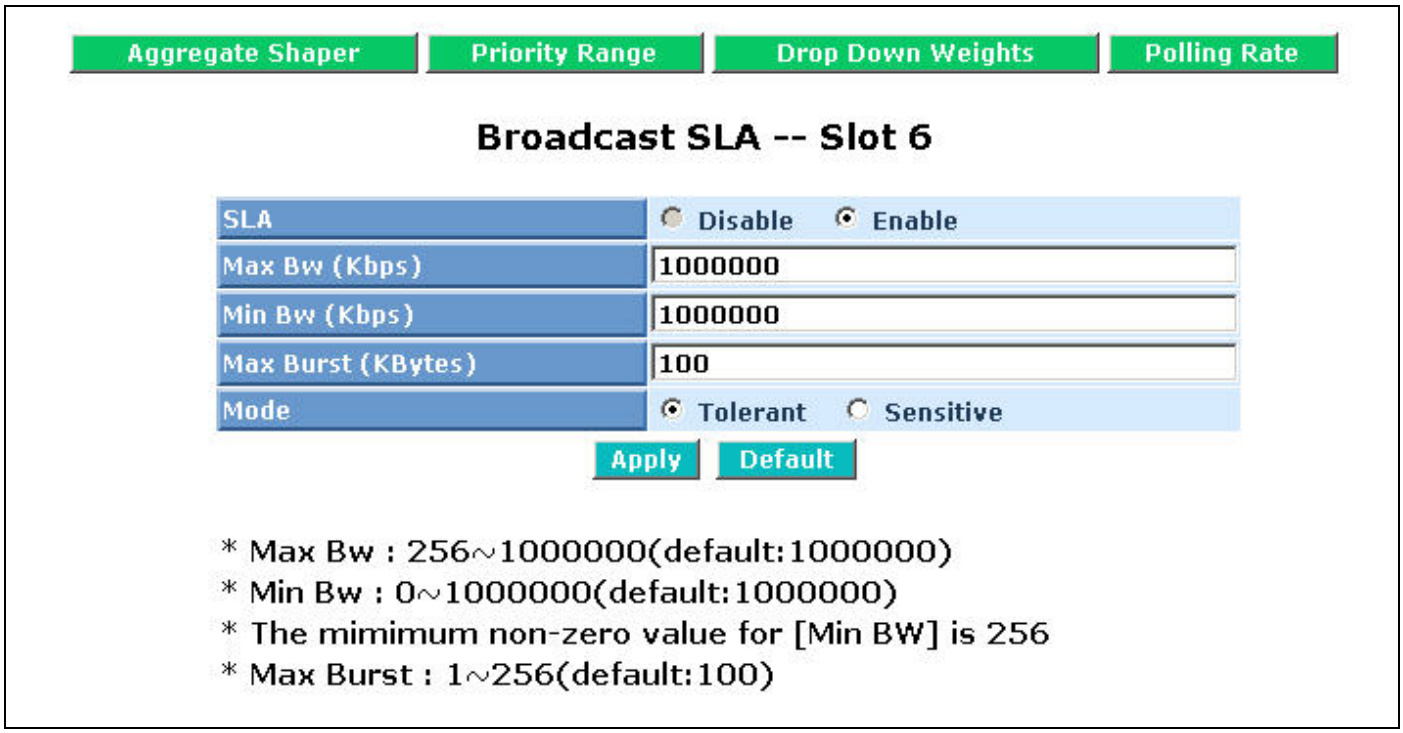


The Downstream direction needs to configure the Drop Down Weight.

Range: 0~ 256 (Units: KBytes)

Default: 4

3-2-6-2 Broadcast SLA



This parameter is SLA of using in Broadcast Link. This set DBA Priority Range should only be performed on a disabled OLT with no links registered.

Parameter description:

Maximum Allowed Bandwidth (Max Bw)

Range: 256~1000000

Default: 1000000

Minimum Guaranteed Bandwidth (Min Bw)

Range: 256~1000000

Default: 1000000

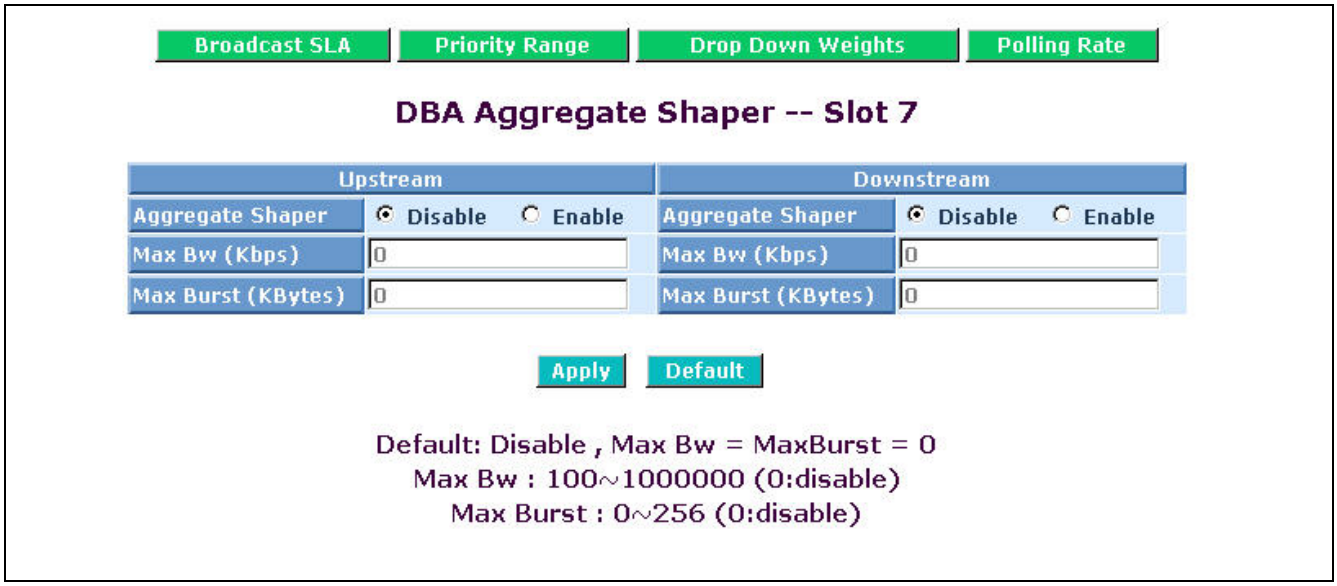
Max Burst:

Range: 1~256

Default: 100

CENTRAL DE SERVIÇOS AO CLIENTE
0800 412100

3-2-6-3 Aggregate Shaper



This command can control overall bandwidth for user traffic in upstream and downstream. When this parameter is set 0. That means the Aggregate Shaper is disabled. This command is disabled by default. If Maximum Allowed Bandwidth or Max Burst is 0, this function is disabled.

Parameter description:

Maximum Allowed Bandwidth (Max Bw)

Range: 100~1000000

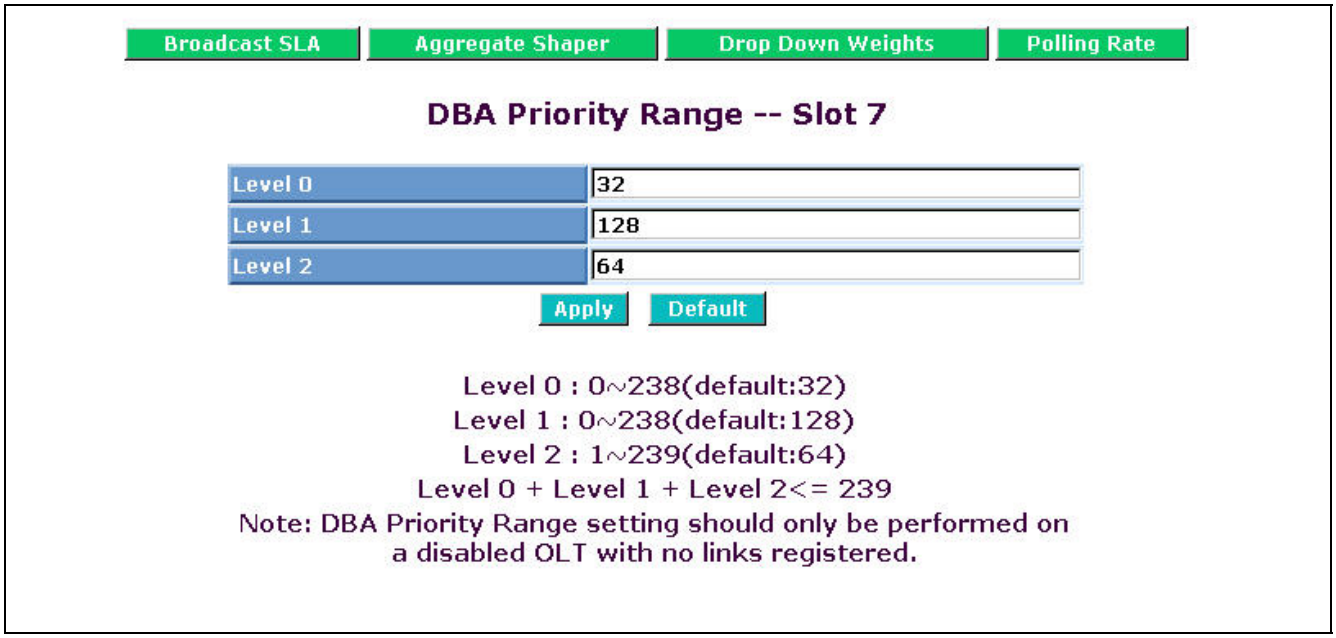
Default: 0

Max Burst:

Range: 0~256

Default: 0

3-2-6-4 Priority Range



This command can set how many Logical Links in the priority Level. That set Priority Range should only be performed on a disable OLT with no links registered. The Priority Level illustrates as Table 3-2-6-1. The Level 0 and Level 1 can be set to 0, but Level 2 must more than 0. The sum of all Priority Range should add up to no more than 239.

Parameter description:

Level 0:

Range: 0~238

Default: 32

Level 1

Range: 0~238

Default: 128

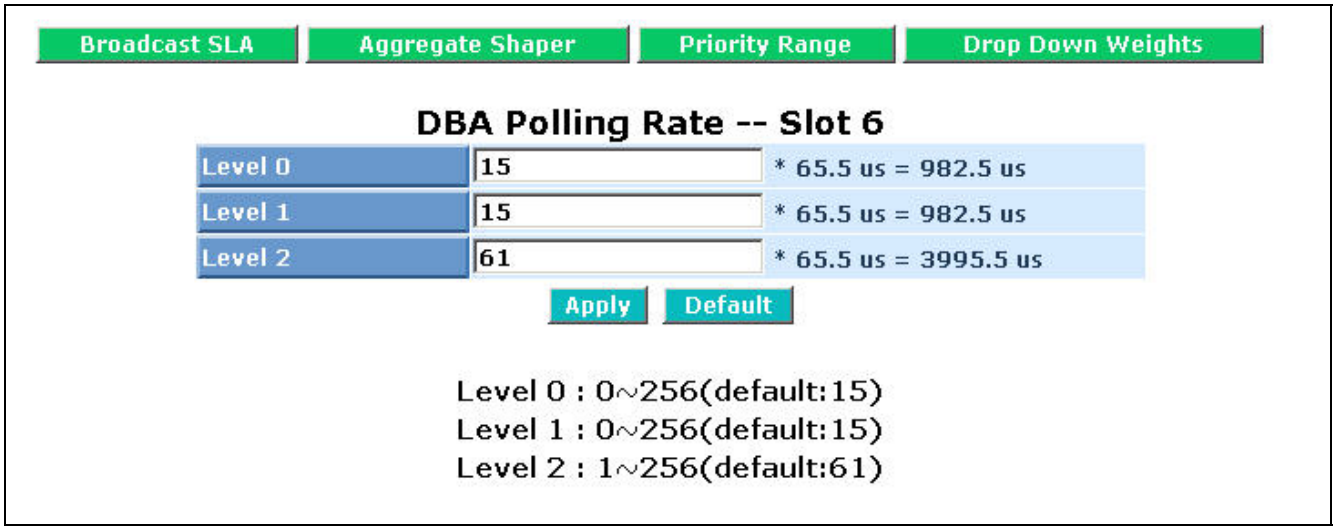
Level 2

Range: 1~239

Default: 64

CENTRAL DE SERVIÇOS AO CLIENTE
0800 412100

3-2-6-5 Polling Rate



This command can set DBA Polling rates for the three levels. Registered links in Active scheduler levels must be provisioned with a non-zero polling rate. If the parameter is set as zero, that means scheduler level is disabled. This parameter can be set in increments of 65.5 usec.

Parameter description:

Level 0

Range: 0~256

Default: 15

Level 1

Range: 0~256

Default: 15

Level 2

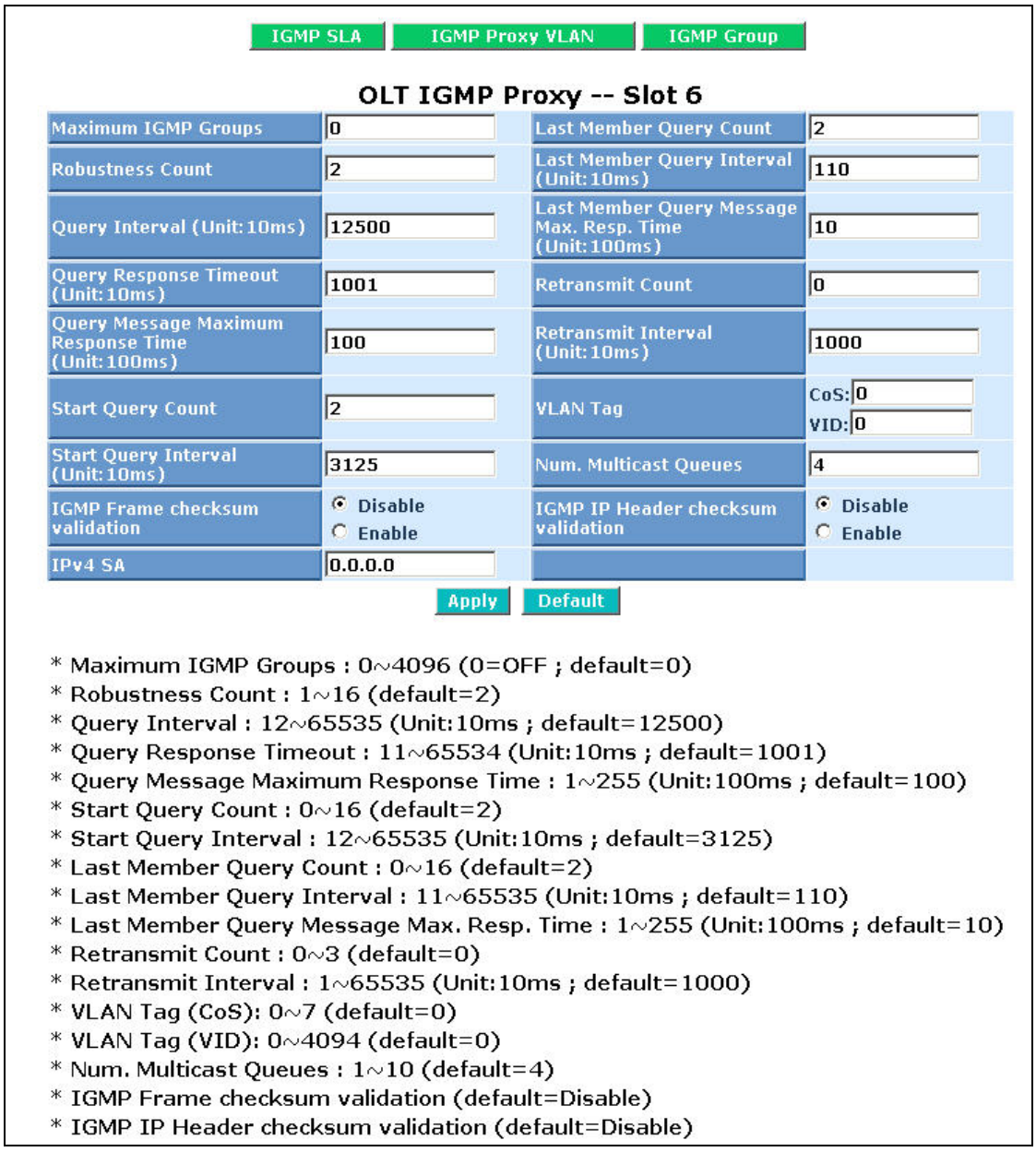
Range: 1~256

Default: 61

3-2-7 OLT IGMP Proxy

This session describes the implementation of IP multicast processing. The EPON system supports IGMP version 1 and IGMP version 2, efficient use of network bandwidth, and fast response time for channel changing. IGMP version 1 (IGMPv1) is described in RFC1112 ,and IGMP version 2 (IGMPv2) is described in RFC 2236. The detail about OLT IGMP Proxy is attached on Appendix A Chapter 5.

3-2-7-1 IGMP Proxy



* Maximum IGMP Groups : 0~4096 (0=OFF ; default=0)
* Robustness Count : 1~16 (default=2)
* Query Interval : 12~65535 (Unit:10ms ; default=12500)
* Query Response Timeout : 11~65534 (Unit:10ms ; default=1001)
* Query Message Maximum Response Time : 1~255 (Unit:100ms ; default=100)
* Start Query Count : 0~16 (default=2)
* Start Query Interval : 12~65535 (Unit:10ms ; default=3125)
* Last Member Query Count : 0~16 (default=2)
* Last Member Query Interval : 11~65535 (Unit:10ms ; default=110)
* Last Member Query Message Max. Resp. Time : 1~255 (Unit:100ms ; default=10)
* Retransmit Count : 0~3 (default=0)
* Retransmit Interval : 1~65535 (Unit:10ms ; default=1000)
* VLAN Tag (CoS): 0~7 (default=0)
* VLAN Tag (VID): 0~4094 (default=0)
* Num. Multicast Queues : 1~10 (default=4)
* IGMP Frame checksum validation (default=Disable)
* IGMP IP Header checksum validation (default=Disable)

CENTRAL DE SERVIÇOS AO CLIENTE
0800 412100

This command has many parameters. The relationship of these parameters are detailed in Figure 3-2-7-1-1.

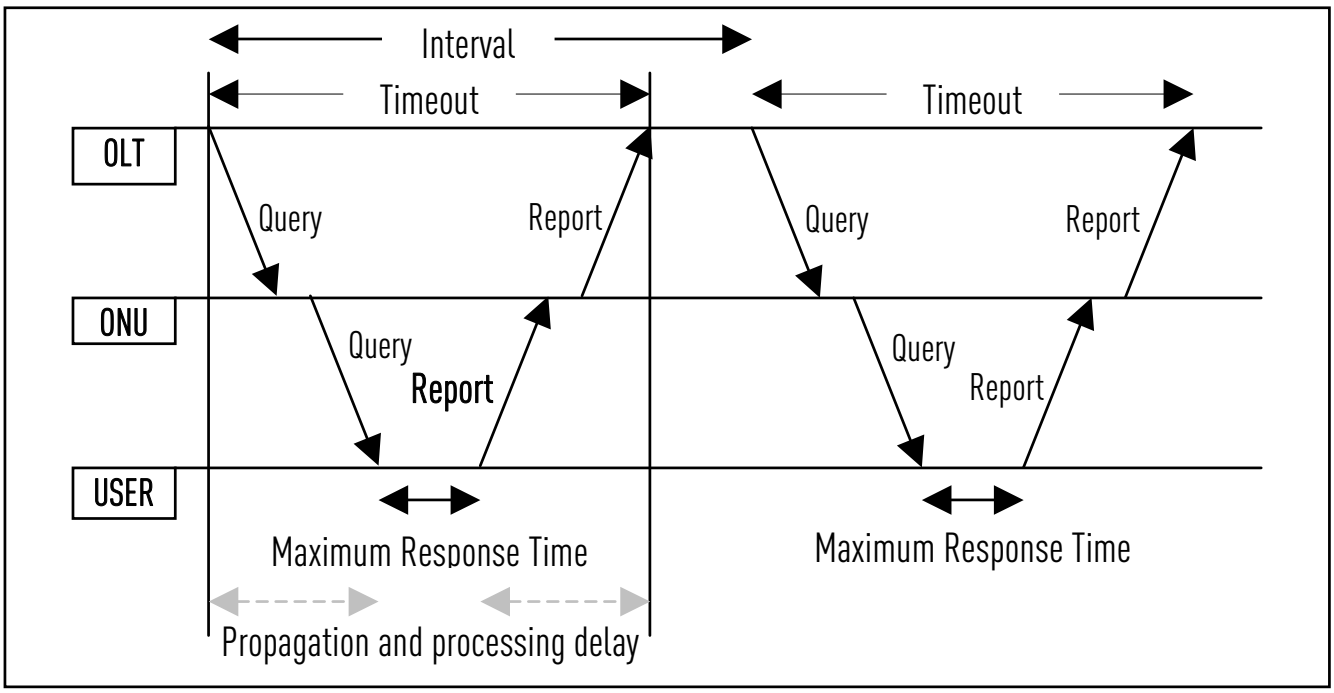


Figure 3-2-7-1-1 Relationship of IGMP Proxy parameters

Parameter description:

Maximum IGMP Groups:

This parameter means how many IGMP Groups can support. If this parameter is 0, the IGMP Proxy is disabled. When IGMP is disabled, all IP Multicast Frames are forwarded by the OLT. If the current number of groups is equal to maximum IGMP Groups, no new groups will be added or forwarded by the OLT, and joins for new groups will be discarded.

Range: 0~4096 (0=OFF)

Default: 0

Robustness Count:

This parameter represents the number of IGMP General Queries. The Robustness Count may pass with no corresponding IGMP Report reply before a Group is removed.

Range: 1~16 (Unit: 10ms)

Default: 2

Query Interval:

This parameter is a time interval.

Range: 12~65535 (Unit: 10ms)

Default: 12500

Query Response Timeout

This parameter is the OLT waits for IGMP Reports after sending a General IGMP Query. If the timer expires, and the Group does not receive a report, then the Robustness counter is decremented.

Range: 11~65534 (Unit: 10ms)

Default: 1001

Query Message Maximum Response Time

This parameter is the actual value set in the Maximum Response Time field of IGMP General Query messages sent down stream by the OLT. The Query Message Maximum Response Time must lower than the Query Response Timeout.

Range: 1~255 (Unit: 100ms)

Default: 100

Start Query Count

If IGMP is enabled or reset, the OLT uses Startup Queries initially. The Group memberships are quickly established after initialization.

Range: 0~16

Default: 2

Start Query Interval

This interval must lower than the regular IGMP General Query Interval.

Range: 12~65535 (Unit: 10ms)

Default: 3125

CENTRAL DE SERVIÇOS AO CLIENTE
0800 412100

Last Member Query Count

This parameter is the number of IGMP Group Specific Queries sent when an IGMP Leave message is received for a specific Group. If this count is 0 and Last Member Query Interval expires, the multicast group is removed, multicast traffic forwarding for the group is stopped.

Range: 0~16

Default: 2

Last Member Query Interval

This parameter is an interval, which IGMP Group Specific Queries are sent. The Last Member Query Interval higher than the Last Member Query Maximum Response Time.

Range: 11~65535(Unit: 10ms)

Default: 110

Last Member Query Message Maximum Response Time (Last Member Query Message Max. Resp. Time)

The Last Member Query Message Maximum Response time set in the Maximum Response Time filed of IGMP Group Specific Query messages sent downstream. This value must be lower than the Last Member Query Interval.

Range: 1~255 (Unit: 100ms)

Default: 10

Retransmit Count

Range: 0~3

Default: 0

Retransmit Interval

This is an interval, which represents the interval at which IGMP Reports (Joins) are retransmitted upstream.

Range: 1~65535 (Unit: 10ms)

Default: 1000

VLAN Tag (CoS)

This parameter is a fixed VLAN tag. It is added into IGMP Messages generated by the OLT and strip VLAN tags off of multicast traffic on a specific VLAN.

Range: 0~7

Default: 0

VLAN Tag (VID)

Range: 0~4094

Default: 0

Num. Multicast Queues

If IGMP is enabled, the multicast data flow has Queues of "Num. of IGMP queues".

Range: 1~10

Default: 4

IGMP Frame checksum validation

This parameter can set IGMP Frame checksum validation. It has two modes, Enable and Disable.

Default: Disable

IGMP IP Header checksum validation

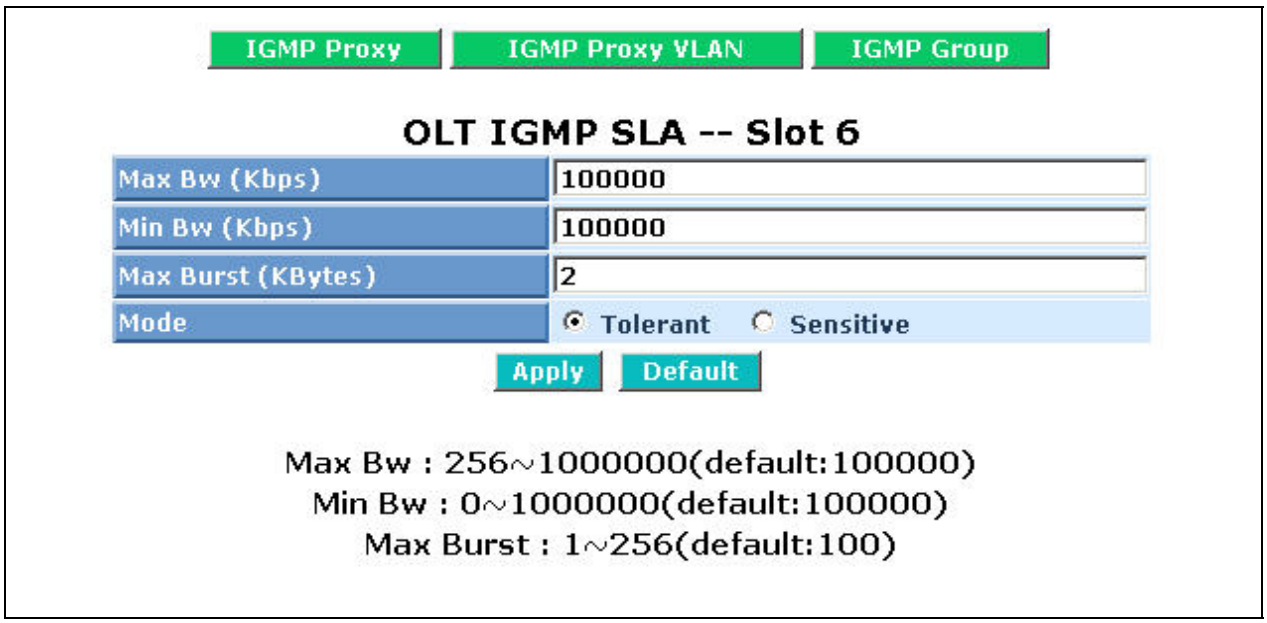
This parameter can set IGMP IP Header checksum validation. It has two modes, Enable and Disable.

Default: Disable

CENTRAL DE SERVIÇOS AO CLIENTE
0800 412100

3-2-7-2 IGMP SLA

This command can control multicast SLA. It is in effect when the IGMP Proxy is enabled. This command has four parameters, Maximum Allowed Bandwidth, Minimum Guaranteed Bandwidth, Max Burst, and delay sensitive (mode). If the delay sensitive is "Sensitive", but the Min Bw and Max Bw are not the same, this setting is Invalid.



Parameter description:

Maximum Allowed Bandwidth (Max Bw)

Range: 256~1000000

Default: 100000

Minimum Guaranteed Bandwidth (Min Bw)

Range: 0~1000000

Default: 100000

Max Burst

Range: 1~256

Default: 100

Delay sensitive (Mode)

This parameter has two modes, Sensitive and Tolerant.

3-2-7-3 IGMP VLAN

This command can configure the VID and bandwidth for the IPMC. There are 8 groups can be set. The Network VLAN Tag is used on the frame of uplink side on the OLT. The EPON VLAN Tag is used for the downstream of the OLT. Thus the command can add tag, strip tag, retain tag, or replace tag. Every Group must set Min Bandwidth, Max Bandwidth, and Default Per-Channel Bandwidth.

IGMP Proxy | IGMP SLA | IGMP Group

OLT IGMP VLAN Provisioning -- Slot 6

FCFS Pool Size (Kbps) 0 (0~1000000)

No	Network VLAN Tag		EPON VLAN Tag		Min Bandwidth	Max Bandwidth	Default Per-Channel Bandwidth	Add
	CoS	VID	CoS	VID				
1								
2								
3								
4								
5								
6								
7								
8								

Apply

* CoS : 0~7 (default:0)
* VID : 0~4094 (default:0)
* Min Bandwidth : 0~1000000 (default:0)
  It is the guaranteed CAC bandwidth reserved for a VLAN.
* Max Bandwidth : 0~1000000 (default:1000000)
* Default Per-Channel Bandwidth : 0~1000000 (default:0)
* The total amount of Minimum Bandwidth for each VLAN
  plus FCFS pool size can not exceed 1000000(1G).
* IGMP report(join) for a new group of a particular VLAN will be rejected
  if any of the following conditions occurrs :
  (1)the amount of channel bandwidth for joined groups and the new group
  exceeds Maximum Bandwidth for that VLAN.
  (2)the channel bandwidth for a new group is greater than the sum of
  the following two bandwidth values:
  [A] CAC bandwidth remained in that VLAN
  [B] unused bandwidth in FCFS
  where [A]=Min Bandwidth - currently consumed bandwidth;
  if (Min Bandwidth - currently consumed bandwidth)<0 then [A]=0.
  (3)there is not any FIFO(queue) that has enough remaining SLA bandwidth
  for the new group.

Parameter description:

CENTRAL DE SERVIÇOS AO CLIENTE
0800 412100

Network VLAN TAG / EPON VLAN TAG - Cos

Range: 0~7

Default: 0

Network VLAN TAG / EPON VLAN TAG - VID

Range: 0~4094

Default: 0

Min Bandwidth

Range: 0~1000000

Default: 0

Max Bandwidth

Range: 0~1000000

Default: 1000000

Default Per-Channel Bandwidth

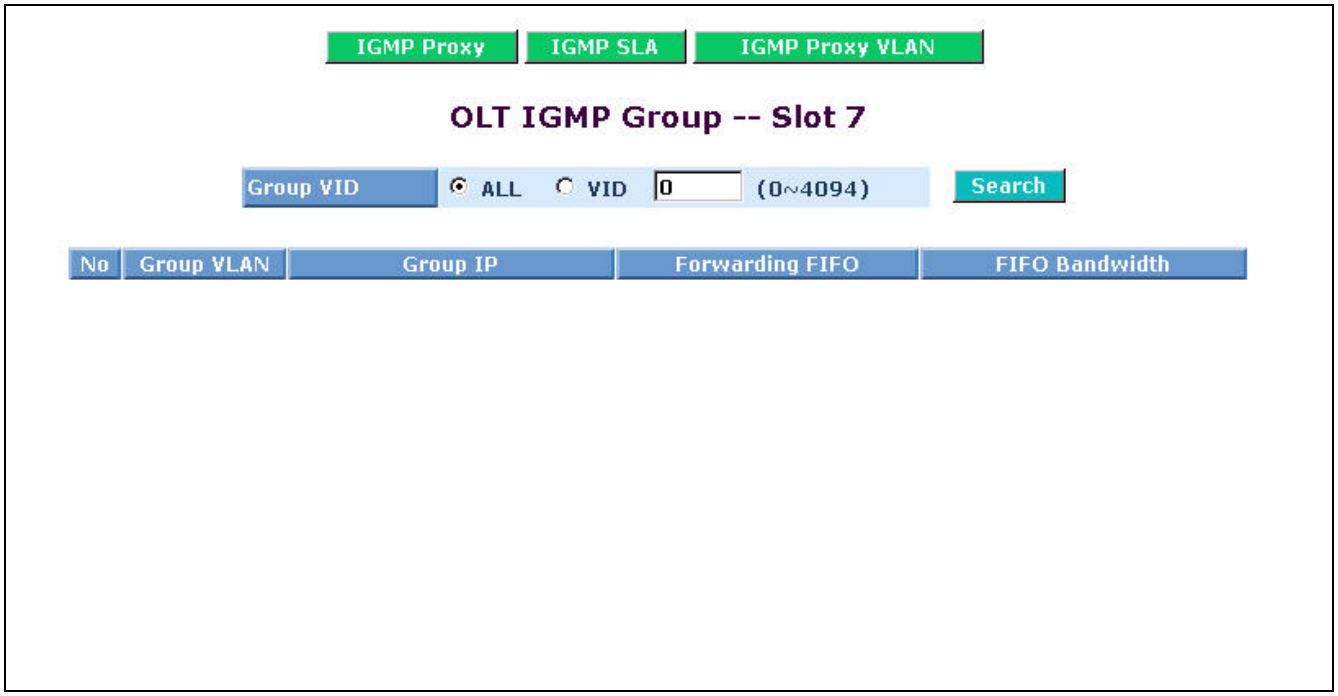
This parameter means per channel give a default bandwidth.

Range: 0~1000000

Default: 0

3-2-7-4 IGMP Group

This command can show all IGMP group status for each VLAN or all VLAN. The List represents the Group IP of Group VLAN, and how many bandwidths it has.

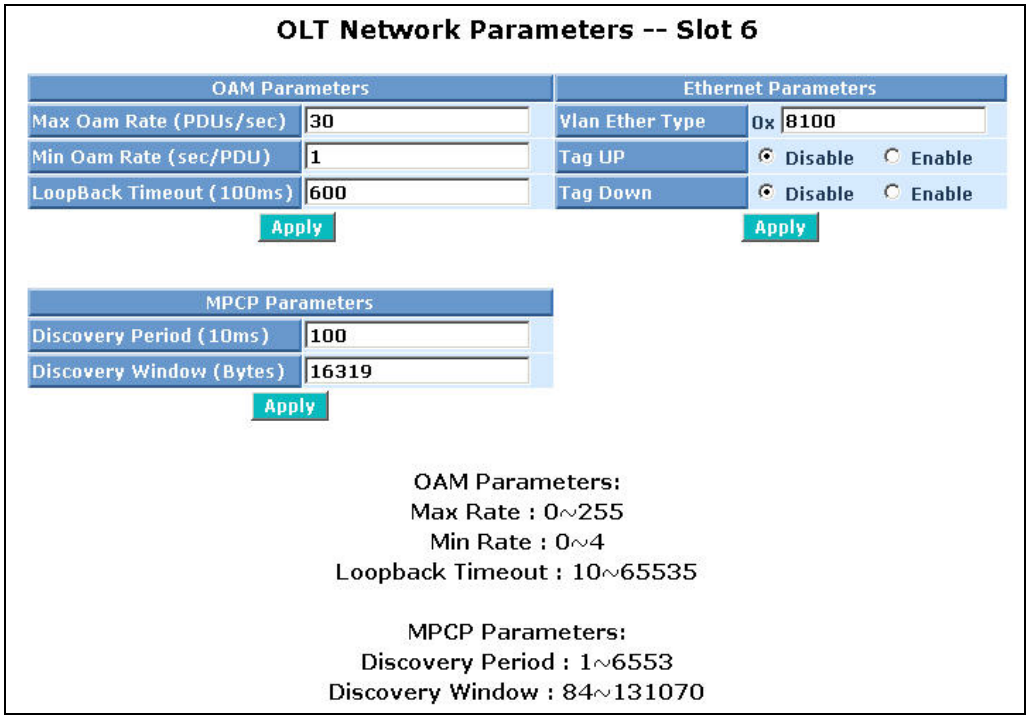


CENTRAL DE SERVIÇOS AO CLIENTE
0800 412100

3-2-8 Network Parameters

Function description:

A Dialogue box for configuring some OLT-specific network parameters. These parameters are divided into four portions: OAM Parameters, Ether Type parameter, MPCP parameters and Autonomous Message Control.



Parameter description:

OAM Parameters:

Max OAM Rate(PDU/sec)

Total OAM PDU transmission per second per logical link is limited to the Max OAM Rate specified. A value of zero disables the limit and allows an unlimited number of OAM frames on a logical link.

Default: 10 (PDUs/sec)

Min OAM Rate(sec/PDU)

One OAM Information PDU are generated at Min OAM Rate,if no other OAM PDU is transmitted for the defined length of time. OAM link failure occurs when five minimum OAM intervals have passed with no OAM message received.

Default: 1 sec

Loopback Timeout(100 msec)

The loopback failsafe timeout value. A port or a logical link on an ONU which is commanded to get into loopback mode will remain in this state until receiving the OAM "Loopback Disable" command, or until this timer expires.

Default: 600

Additional Ether Type parameters:

The firmware of the OLT uses the default Ethertype of 0x8100 to identify frames with VLAN tags. For the interoperability in some special application using VLAN, an additional Ethertype to identify VLAN frames may be defined here.

VLAN Ether Type

The additional Ether Type to specify

Default: 0x8100

Tag Up

Use the VLAN Ether Type Specified above to tag upstream

Default:[Disable]

Tag down

Use the VLAN Ether Type Specified above to tag downstream

Default:[Disable]

MPCP parameters

The parameters for the MPCP(IEEE802.3ah, clause 64 - Multi-point Mac Control Protocol) discovery process.

Discovery Period(10ms)

The period of time for the OLT to generate a discovery gate.

Default:100 (=1 Second)

Discovery Window

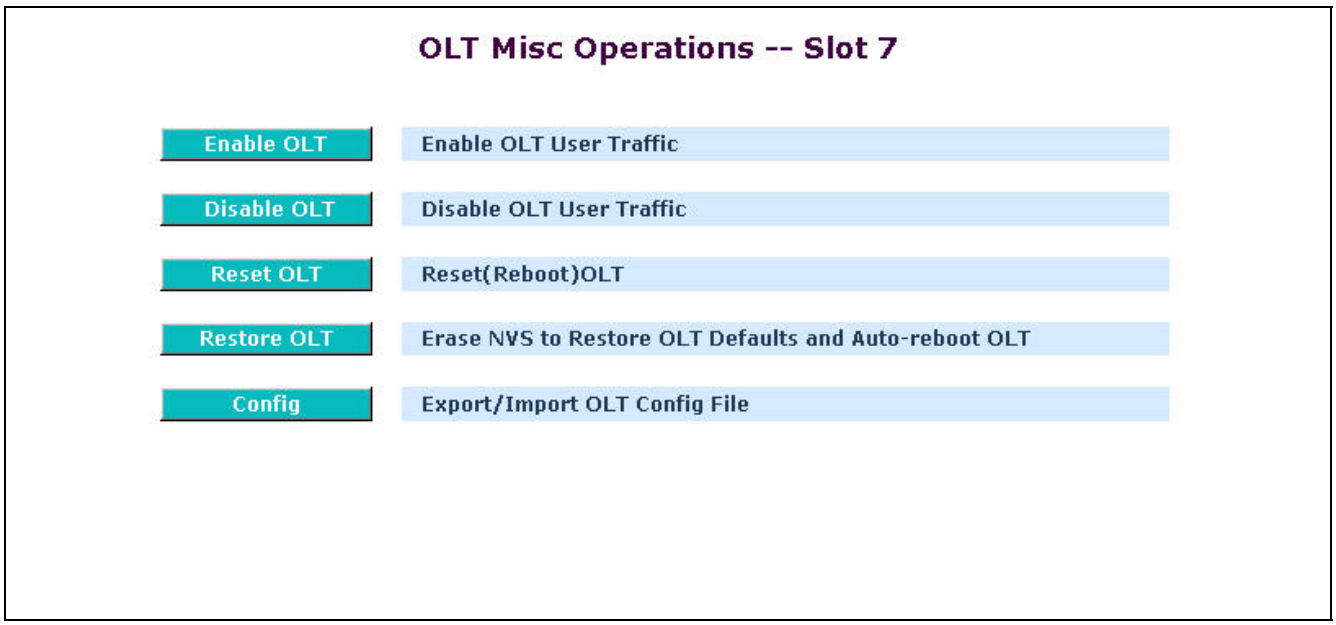
The size in byte of the MPCP discovery window in a EPON system

Default: 16319

3-2-9 OLT Operations

CENTRAL DE SERVIÇOS AO CLIENTE
0800 412100

Function description:



Parameter description:

Enable OLT

Enable OLT to pass user traffic

Disable OLT

Disables the OLT, turning off the EPON port and blocking both upstream and downstream traffic.

Reset OLT

Reboot OLT

Restore OLT

Erase all provisioning records of Non-Volatile Store (NVS) and reboot the OLT. This operation returns the operator provisioning database to default values.NVS is an area of flash memory inside the OLT.The provisioning database of the OLT and its subordinate logical links are kept in this Non-Volatile Store. It includes OLT Traffic Management, OLT Advanced Bridging Config, OLT DBA(Drop Down Weights, Priority Range, Polling Rate, Aggregate Shaper, Broadcast SLA), OLT IGMP Proxy, All Logical Link Bridge Mode, SLA, Multicast SLA).

Config

Export OLT Config File -The provisioning database of the OLT can be exported out as a computer file.

Import OLT config File -This file can be used when provisioning database recovery or replication is needed.

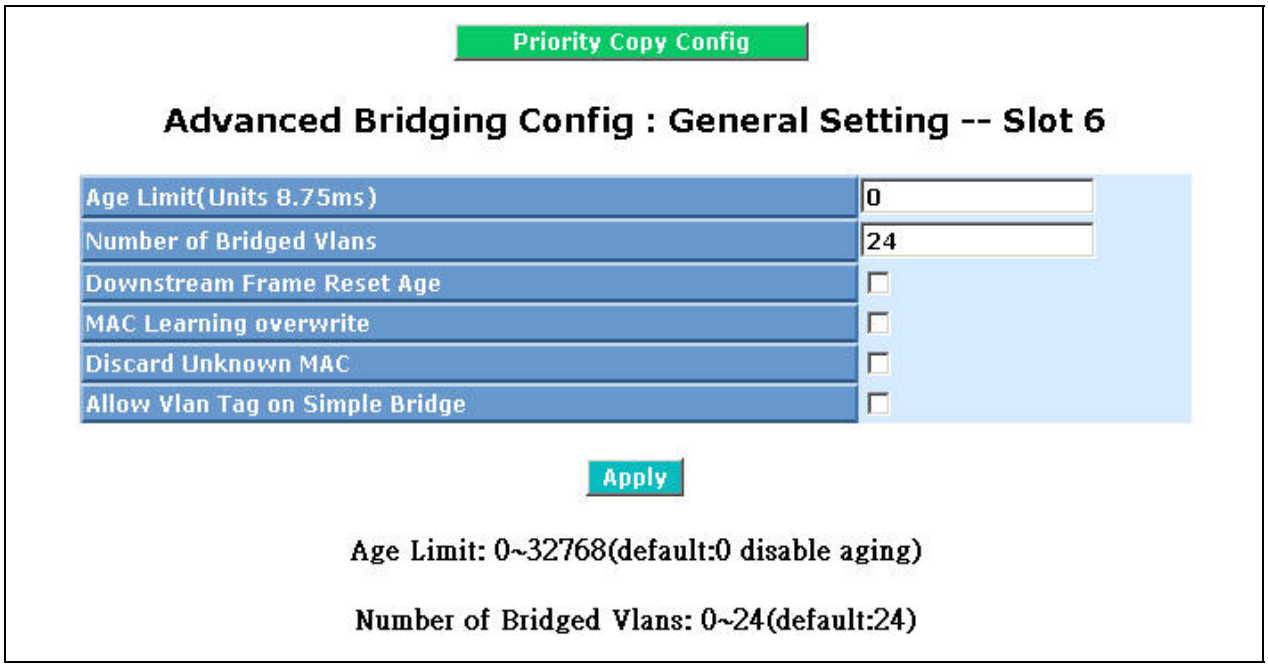
It includes OLT Traffic Management, OLT Advanced Bridging Config, OLT DBA(Drop Down Weights, Priority Range, Polling Rate, Aggregate Shaper, Broadcast SLA), OLT IGMP Proxy, Network Parameters, Port Config, All Logical Link Bridge Mode, SLA, Multicast SLA).

3-2-10 Advanced Bridging Config

3-2-10-1 Advanced Bridging Config : General Setting

Function description:

Advanced Bridging Config include Age Limit, Number of Bridged Vlans, Downstream Frame Reset Age, Mac Learing overwrite, Discard Unknown MAC ,and Allow Vlan Tag on Simple Bridge.



CENTRAL DE SERVIÇOS AO CLIENTE
0800 412100

Parameter description:

Age Limit

Learned entry age limit, Min value is 0. Max value is 32768.

Default: 0

Number of Bridged VLANs

Min value is 0. Max value is 24.

The "Number of bridged VLANs" must be greater than or equal to the number of unique VLAN tags configured in a shared bridging mode.

Default: 24

Downstream Frames Reset Age

Frames received by the OLT LNP port reset the learned entry age value for dynamic entries based on DA of incoming frame. In this mode upstream frames will also reset the age value based on SA as normal.

Default: disable

MAC Learning overwrite

Controls how SA Learning behaves after the per-link Learning table is full. This option is set to 1 to overwrite the oldest learned entry in favour of a new MAC.

Default: disable

Discard unknown MAC

When set to 1 will cause the OLT to drop downstream frames with unknown DAs (i.e. it does not forward on the Broadcast link).

Default: disable

Allow Simple Bridging

Affects the number of Bridged VLANs parameter. (Currently must set to 1)

Default: enable

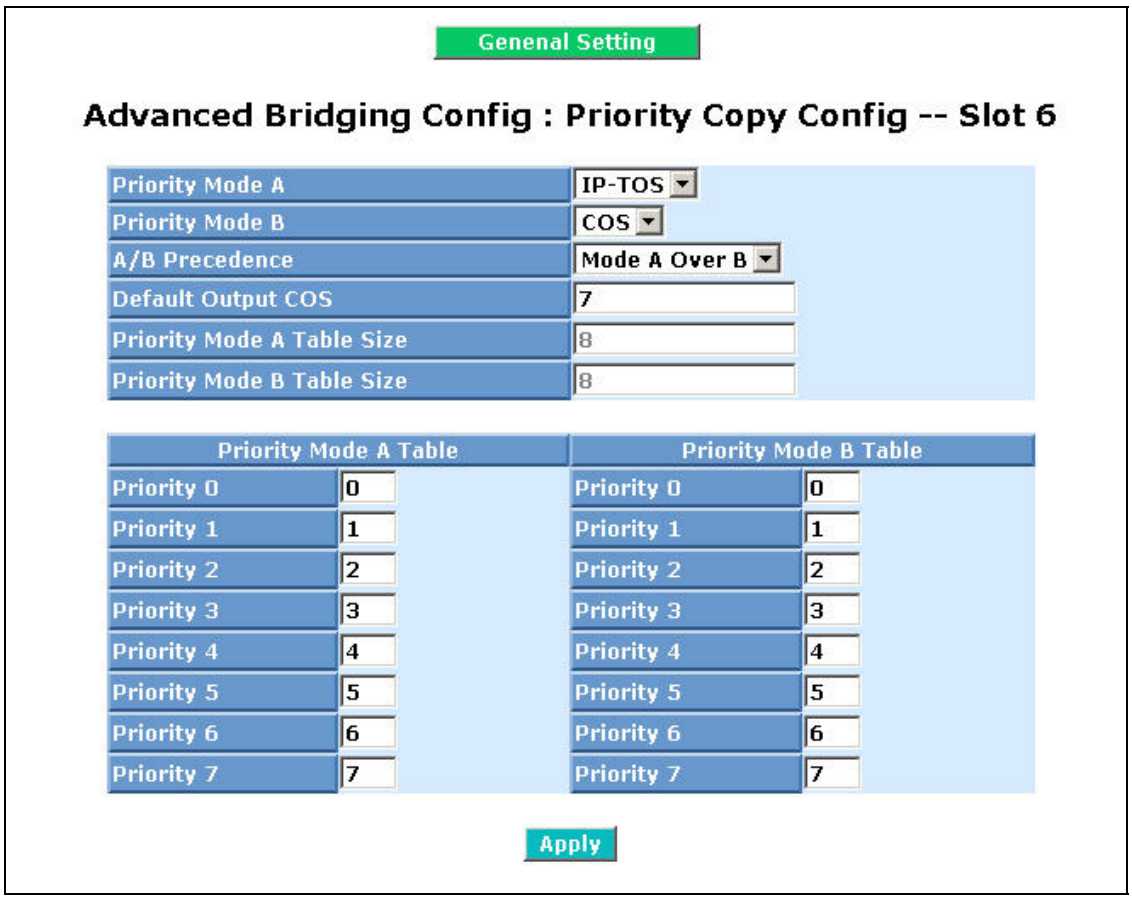
3-2-10-2 Advanced Bridging Config : Priority Copy Config

Function description:

This command sets up the priority conversion table on the OLT for the priority remapping VLAN modes (e.g. Priority Remapping Single VLAN). When a logical link is in a Priority Remapping based VLAN mode, the OLT looks at a specified priority value in the upstream frames and adds a VLAN tag with a COS from the mapping table.

The Priority Mode A/B is a 16-bit value that selects what priority field to lookup in the input frame. Currently the values 0x1545 for Mode A (to select IP-TOS) and 0x1743 for Mode B (to select COS) may be used. The precedence field selects which priority mode (s) to use and in what order. In case the upstream frame does not match the given priority modes, the OLT outputs a default COS value.

As an example, the command, {Priority Mode A = 0x1545; Priority Mode B = 0; Precedence = 0; Default COS = 0; N=8 (1, 1, 2, 2, 3, 3, 4, 4); M = 0} maps TOS values [0, 1] to COS 1, TOS [2, 3] to COS 2 etc. When there is no TOS in the input frame (non-IP frame), the COS value is 0. Priority Mode B is not used in the example and the empty table for Priority Mode B is indicated by setting M = 0.



CENTRAL DE SERVIÇOS AO CLIENTE
0800 412100

3-2-11 OLT Block Link List

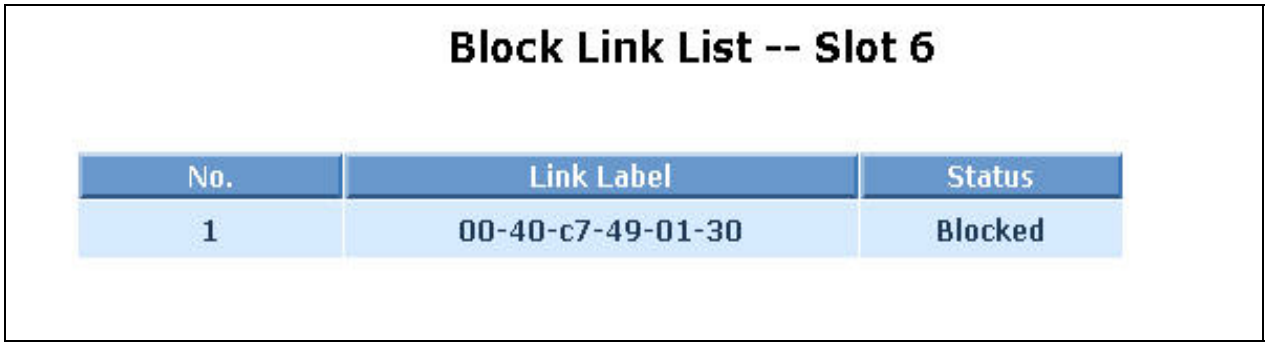
Function description:

Shows a the list of Logical Links that were manually blocked. To unblock a blocked logical link,just select an entry and use [Unblock Link] option to do so.

Parameter description:

Link Label

Mac Address of the blocked logical link.



3-2-12 OLT All known Links

Function description:

Retrieves the list of all logical links configured at the OLT. The logical links displayed include links that have any kind of provisioning,links that were discovered and currently not registered.Provisioning logical links that are not physically connected to an OLT is possible through this window.

Parameter description:

Link Label

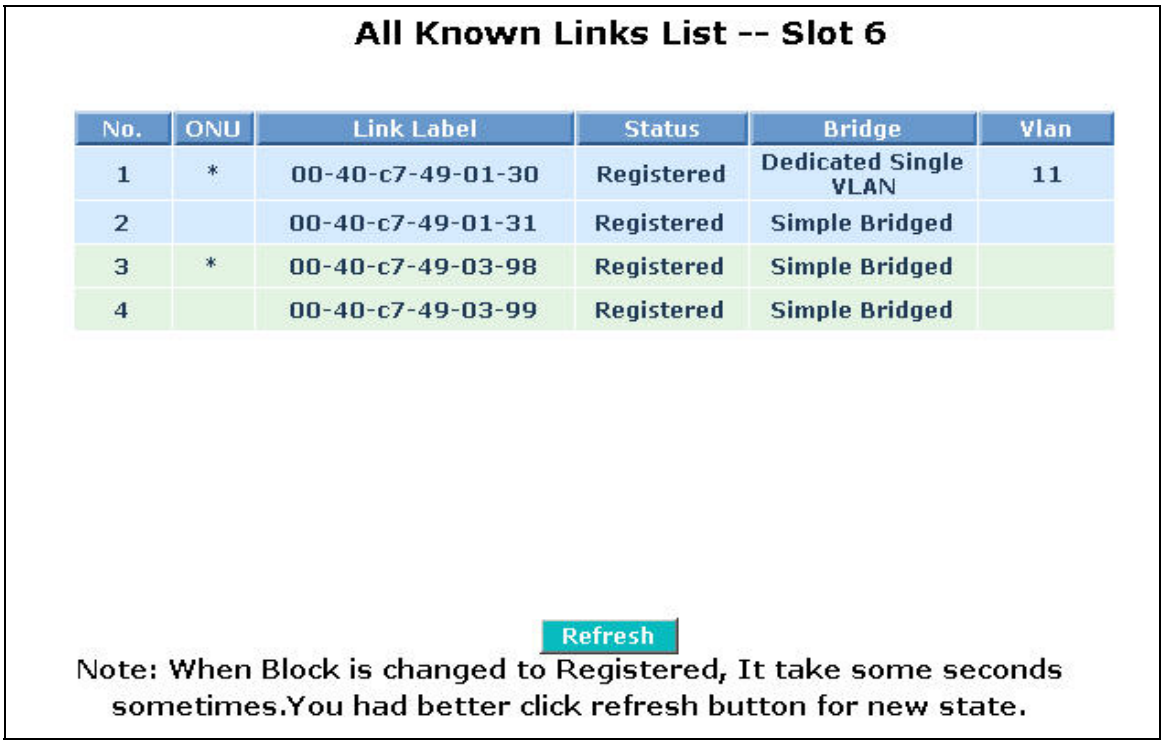
Mac Address of a logical link known to the selected OLT.

Status

The status of a logical link.Possible values are Blocked or Registered.

Bridge, Vlan

Refer to Logical Link Bridge, Vlan Tag.

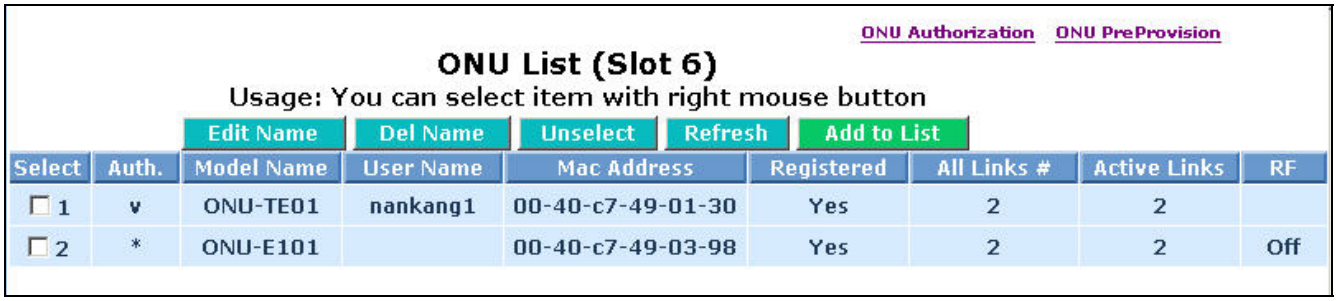


CENTRAL DE SERVIÇOS AO CLIENTE
0800 412100

3-2-13 ONU List

Function description:

The "ONU List" table displays all registered ONUs under an OLT. Click on a row in this table,the corresponding management function submenu of the selected ONU will show up.



ONU Authorization ONU PreProvision

ONU List (Slot 6)

Usage: You can select item with right mouse button

Edit Name | Del Name | Unselect | Refresh | Add to List

Select	Auth.	Model Name	User Name	Mac Address	Registered	All Links #	Active Links	RF
☐ 1	v	ONU-TE01	nankang1	00-40-c7-49-01-30	Yes	2	2	
☐ 2	*	ONU-E101		00-40-c7-49-03-98	Yes	2	2	Off

Parameter description:

Model Name

ONU's model name.

Auth

Auth * indicate that the ONU is in ONU Authorization List. Auth v indicate that the ONU is authorized.

User Name

Every ONU has a globally unique Mac Address. User Name is alias of the Mac Address.Three buttons ([Edit Name] [Del Name][Unselect]) are provided for you to assign alias name and other subscriber information for a selected ONU.

Mac Address

The Mac Address is the unique identity of an ONU.

Registered

Possible values are [Yes] or [No]. If any one logical link of an ONU is discovered,this attribute is [Yes].

All Links #

Total number of logical links provisioned on an ONU.

Active Links

Number of registered logical links belonging to an ONU.Some logical links maybe in the registering process,some maybe blocked by management operation.

RF

RF Module is embedded in ONU with RF function. If ONU has RF function, RF status can display enable/disable. When ONU Model name is "ONU-E101" or "ONU-E101A", there is a value in RF field.

ONU Authorization

When click the item, go to ONU Authorization.

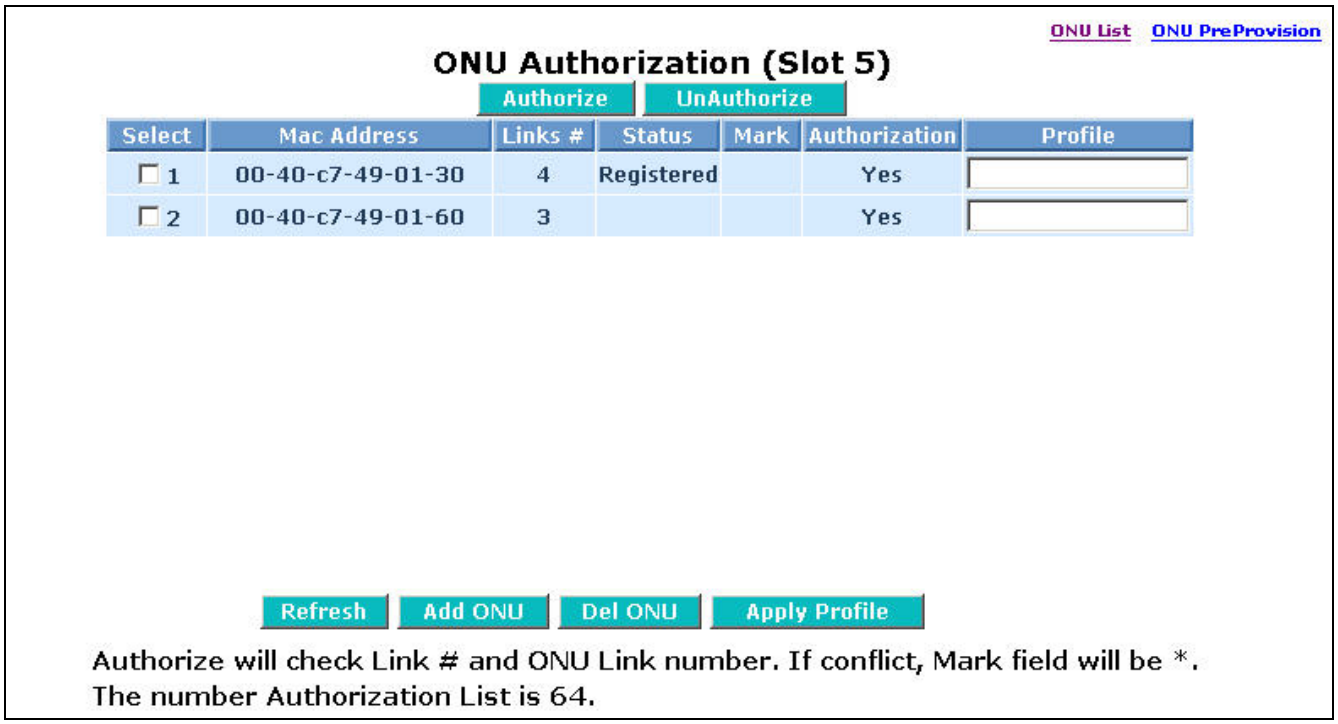
ONU Preprovision

When click the item, go to ONU Preprovision.

3-2-14 ONU Authorization

Function description:

The "ONU Authorization" table displays Authorized/Unauthorized ONUs under an OLT. Click on Select field in this table,You can select the ONU to be authorized. If you want to authorize many ONU once, you can click Select field in the selected ONU and click Authorize button.



CENTRAL DE SERVIÇOS AO CLIENTE
0800 412100

Parameter description:

Mac Address

The Mac Address is the unique identity of an ONU.

All Link #

Total number of logical links provisioned on an ONU.

Status

The status displayed on the ONU. It include "Registered" and " ". "Registered" represent ONU on line. " " represent ONU not Registered.

Mark

Authorize will check Link # and ONU Link number. If conflict, Mark field will be *.

Authorization

It include Yes and No. After ONU is authorized, ONU SLA can be enabled. You can select item with clicking Select field and click Authorize button. All ONU want to have service and you must let ONU be authorized first.

Profile

ONU configuration file. You can import the profile and let ONU has the profile setting.

Authorize

You can select ONU with clicking Select field and click Authorize button. The on line ONU must be authorized and can have service. The unauthorized ONU will have no bandwidth.

UnAuthorize

You can select ONU with clicking Select field and click UnAuthorize button. The unauthorized ONU will have no bandwidth.

Parameter description:

Refresh

The ONU Authorization display don't reflect the current state sometimes. You must click refresh button to display the current state.

Add ONU

If a new ONU is added to EPON system, you can click "te ONU" button to add ONU mac address to Authorization List and can operate on ONU.

Del ONU

Del ONU means that Del ONU from Authorization List.

Apply Profile

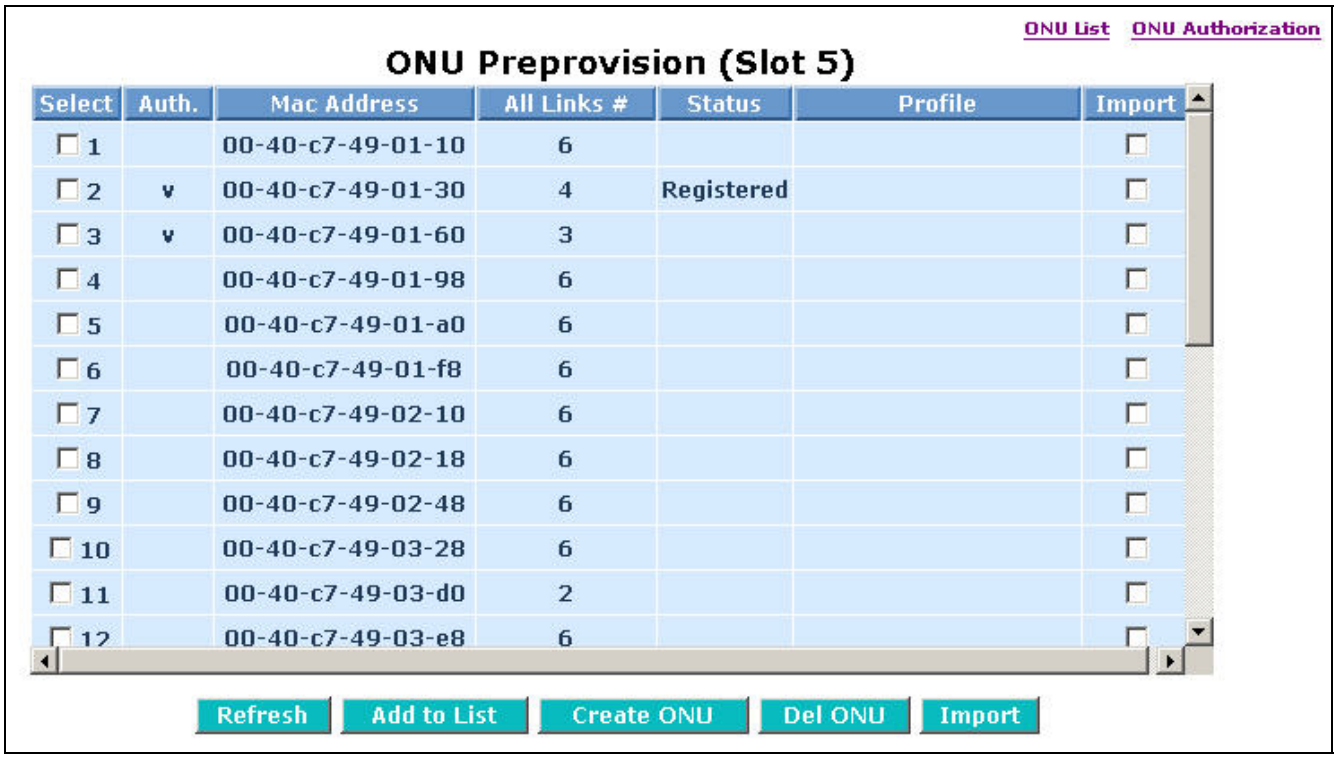
Edit Authorization profile. ONU can be configured by using a "ONU configuration" profile. Once you set ONU profile name O.K., you can go to ONU Provision to import profile to ONU.

CENTRAL DE SERVIÇOS AO CLIENTE
0800 412100

3-2-15 ONU Preprovision

Function description:

The "ONU Preprovision" table displays all known ONUs under an OLT. Click on a row in this table,the corresponding management function "Logical Link List" submenu of the selected ONU will show up.



Parameter description:

Refresh

The ONU Preprovision display

Add to List

Add selected ONU to Authorization List. The Authoriaztion List can be used to authorize/unauthorize ONU.

Create ONU

Create one ONU for ONU Preprovision. The ONU can be set Bridge Mode, SLA.

Del ONU

Del one ONU from ONU Preprovision. The Logical Link Bridge Mode, SLA in the ONU will be removed.

Import

ONU can be configured by using import ONU profile. You must save a configure profile first and click import button to import ONUs that has "checked import" status .

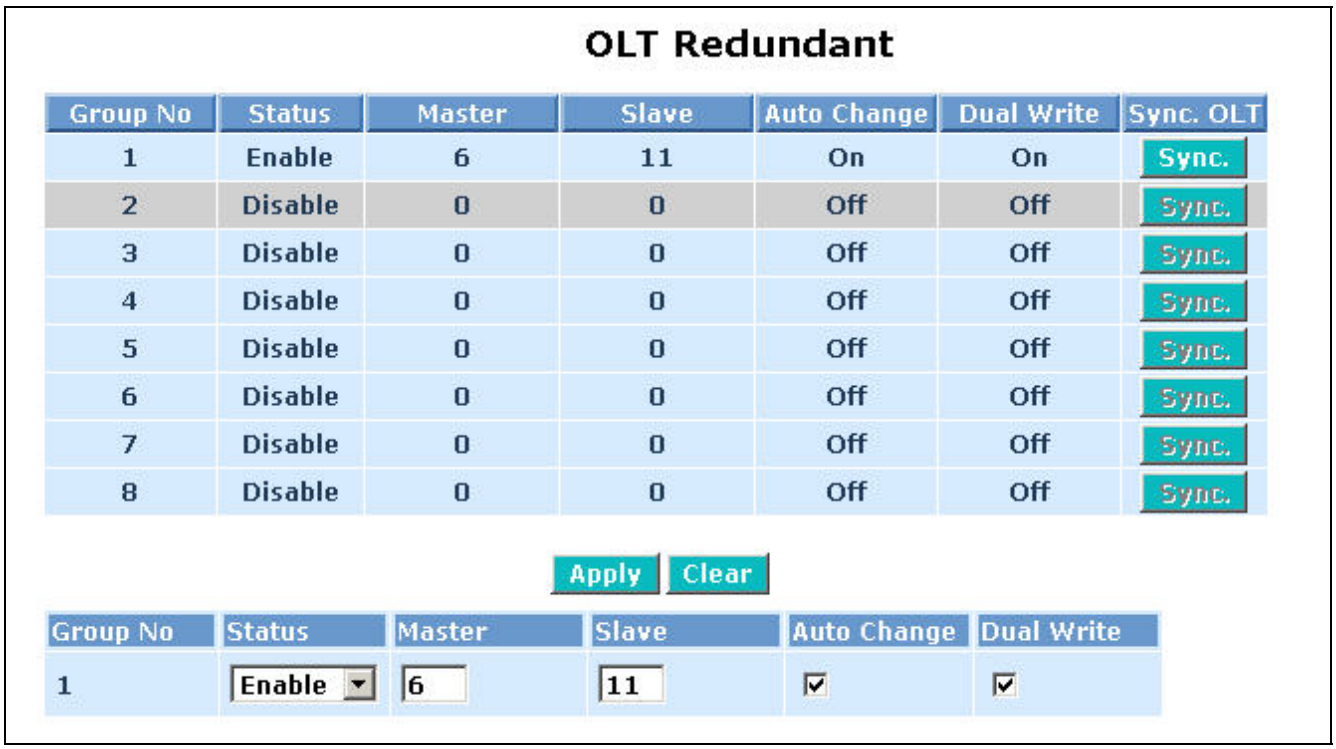
Double click Select title field will select all entries. click Select title field will unselect all entries.
Auth * indicate that the ONU is in ONU Authorization List. Auth v indicate that the ONU is authorized.

3-2-16 OLT Redundant

3-2-16-1 OLT Redundant : Redundant Config

Function description:

The section discribes two OLT can be redundant. One OLT is set to be master OLT, another is set to be slave OLT. When the master OLT is broken or can't be connected with ONUs by using fiber line. The slave OLT will take over master OLT, and the line between the master OLT and the ONUs will be disconnected. The slave OLT will be connected with ONUs. You can set master OLT and slave OLT, and by Setting "Enable" Status the OLT Redundant can be in effect.



CENTRAL DE SERVIÇOS AO CLIENTE
0800 412100

Parameter description:

Status

It include Enable and Disable. If Enable, the OLT redundant function is in effect. If Disable, The OLT redundant doesn't work.

Master OLT

When two OLTs are set redundant enabled. The master OLT is at work, and the slave OLT is a backup OLT. If master OLT is broken, the slave OLT will take over the master OLT. The original slave OLT will be changed to the master OLT. The original master OLT will be changed to slave OLT. Now you can remove the broken OLT and insert the healthy OLT.

Slave OLT

When two OLTs are set redundant enabled. The master OLT is at work, and the slave OLT is a backup OLT. The above figure displays eleventh OLT is Slave OLT. If sixth OLT is broken, the eleventh OLT will be changed to the master OLT.Note that "Auto Change" need to be set on and the slave OLT can be changed to master OLT.

Auto Change

If Auto Change on, the master OLT and the slave OLT switch is automatically changed. If Auto Change off, the master OLT and the slave OLT switch is not automatically changed.

Dual Write

If Dual Write on, you set commands to ONU by way of the master OLT and at the same time the slave OLT is set also. If Dual Write off, you set commands to ONU only by way of master OLT. The slave OLT is not be set.

Sync. OLT

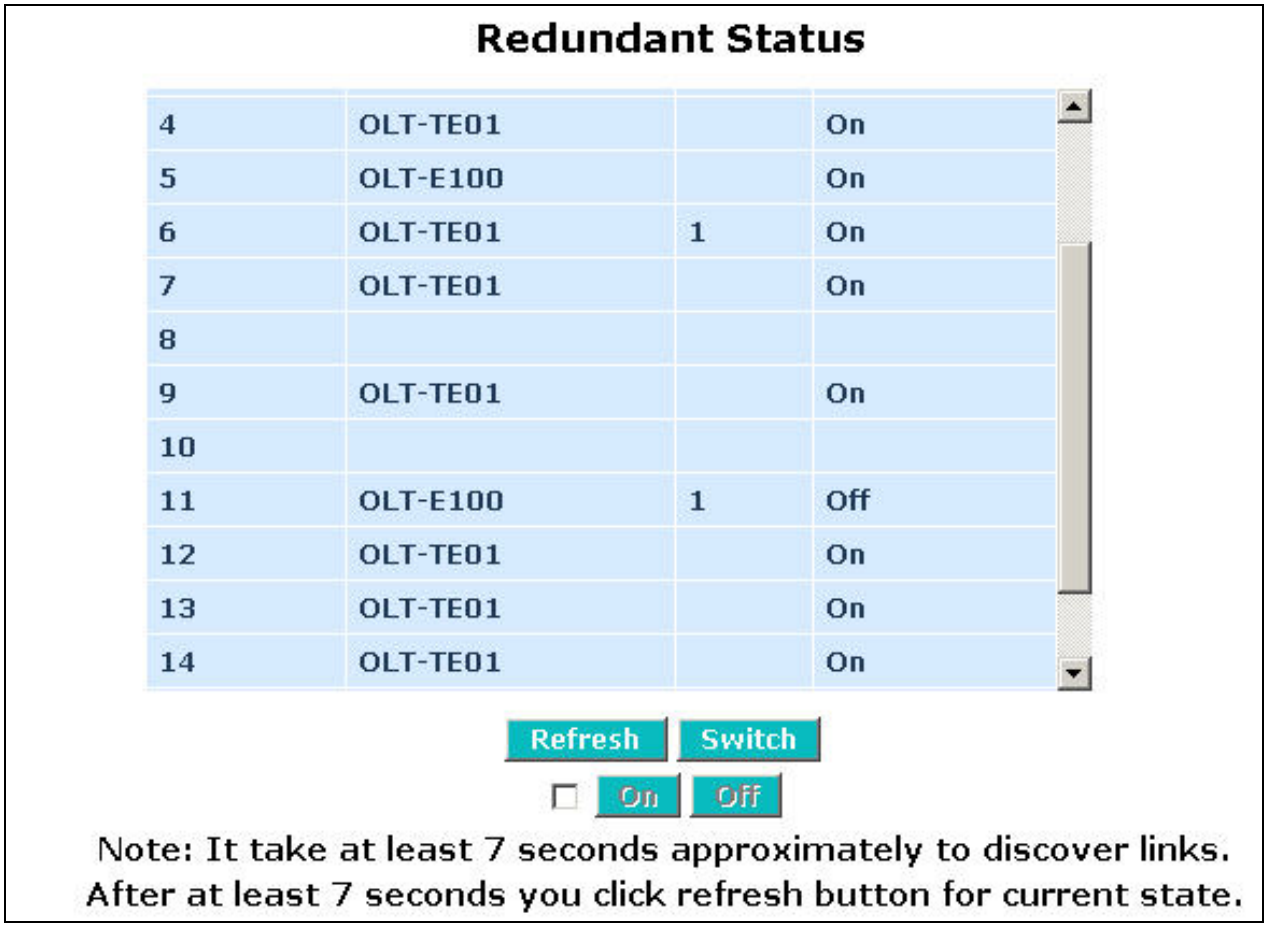
After enable OLT redundant, you must remember to sync OLT. "Sync OLT"

means the master config is set to the slave OLT. When redundant enabled, the master and the slave OLT config must be the same.

3-2-16-2 OLT Redundant : Redundant Status

Function description:

The section discribes OLT redundant status. When two OLT is set to be redundant, the master OLT can connect with ONUs. The fiber line between master OLT and ONUs is passed through. The fiber line between slave OLT and ONUs is not passed through.The redundant status display whether the OLT can connect with ONUs.



Parameter description:

Group

It include 1 ~8. The maximum group number is 8. The group 1 is 6 and 11.

State

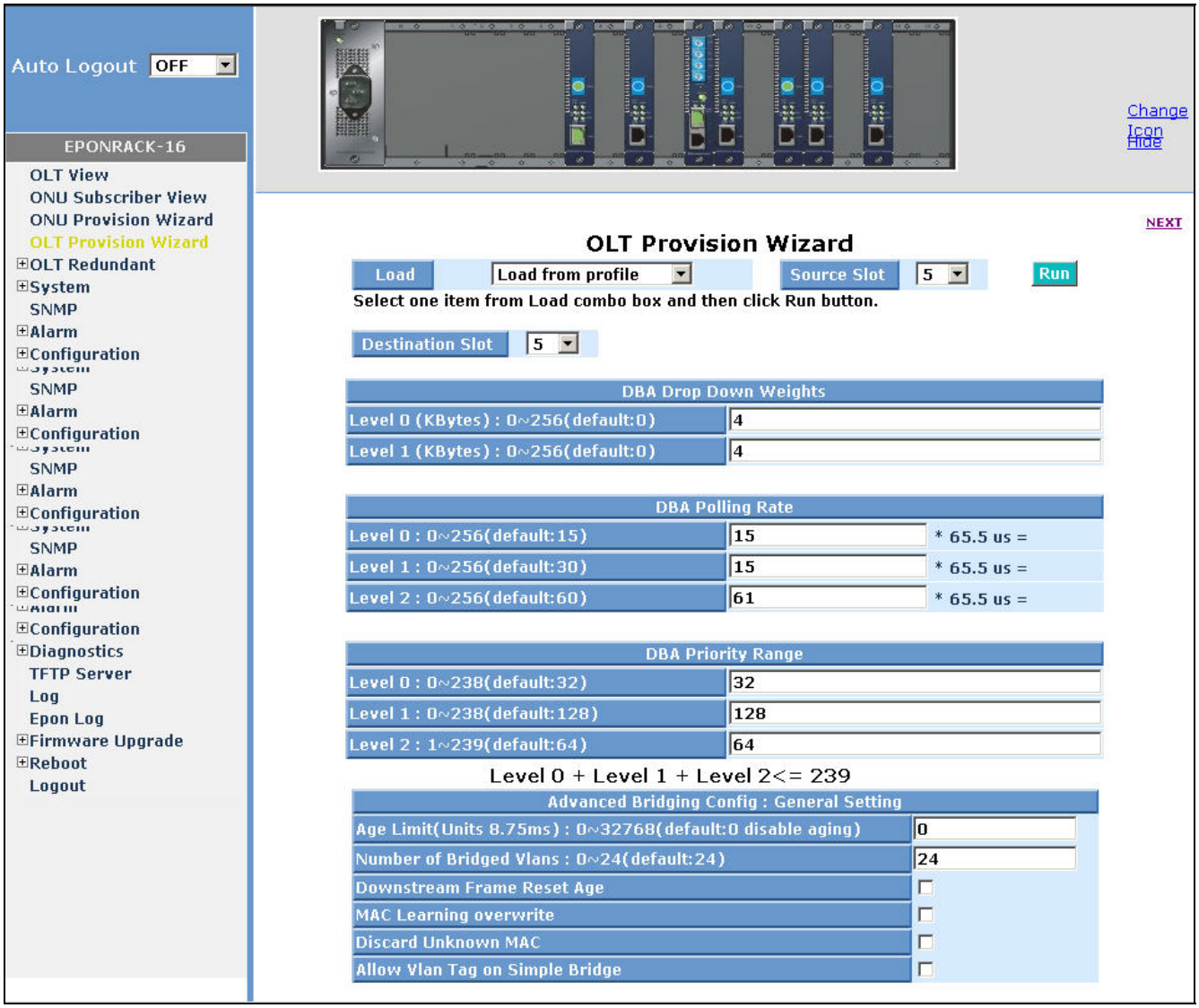
It include On and Off. If on, the fiber line between OLT and ONUs is passed through. If off, the fiber line between OLT and ONUs is not passed through.

CENTRAL DE SERVIÇOS AO CLIENTE
0800 412100

3-2-17 OLT Provision Wizard

Function description:

The section discribes OLT Provision Wizard. You can set OLT DBA Drop Down Weights, DBA Polling Rate ,DBA Priority Range and Advanced Bridging Config. If you select "Load Default"and click Run button, the default OLT setting will be displayed. If you select "Load from other OLT" and then select Source Slot and click Run button, the other OLT setting will be displayed. If you select "Load from profile" and click Run button, the profile setting will be displayed.



Parameter description:

Load

It include Load Default, Load from other OLT, Load from profile.

Source Slot

When you select "Load from other OLT" , the Source Slot setting will be in effect. Click Run button and Source Slot setting will be loaded.

Destination Slot

The setting will be set in Destination.

Run

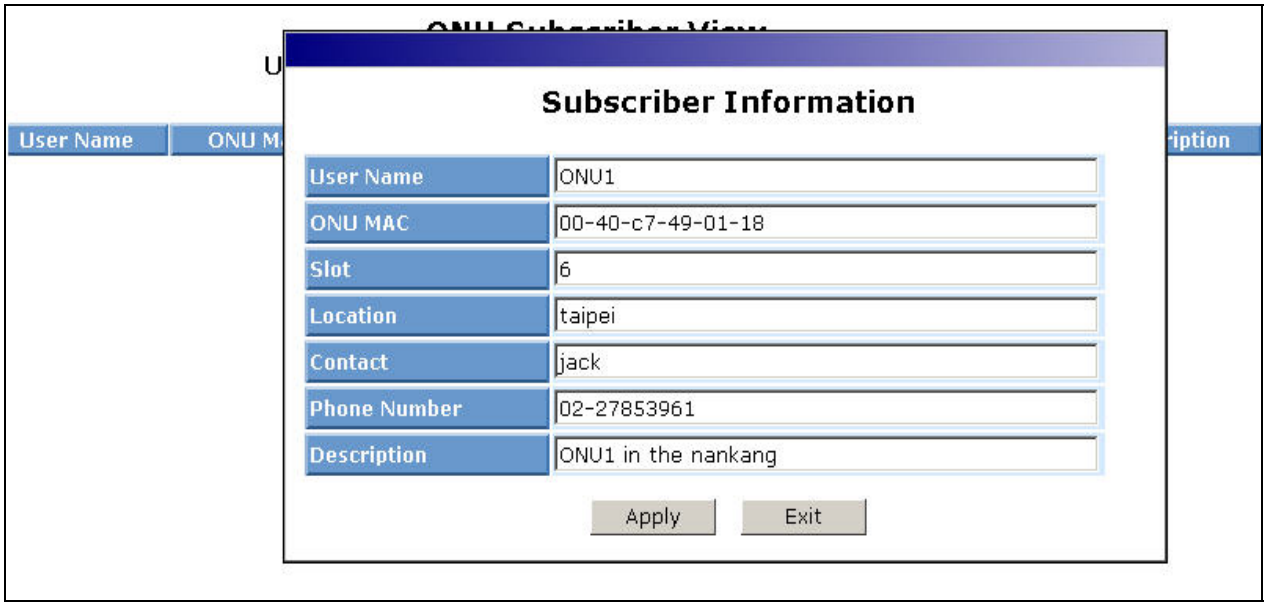
Before clicking the Run button you will need to select Load option and Source Slot.

3-3 ONU

3-3-1 ONU Subscriber View

List ONU that has subscribed. The subscriber include User Name, ONU Mac Address, Slot, Location, Contact, Phone #, Description.

If you click Add button, Subscriber Information Dialog will be displayed. You can add an ONU subscriber information to the database . User Name and ONU Mac have to be filled in.



CENTRAL DE SERVIÇOS AO CLIENTE
0800 412100

Parameter description:

User Name

Fill in usef-defined name for the connected ONU.

ONU Mac Address

Fill in ONU base mac Address for the connected ONU.

Slot

Fill in the slot that OLT linked for the target ONU is located at.

Location

Fill in the location for the ONU devce that the clicked slot connects.

Contact

Fill in the contact person for the ONU device that the clicked slot connects.

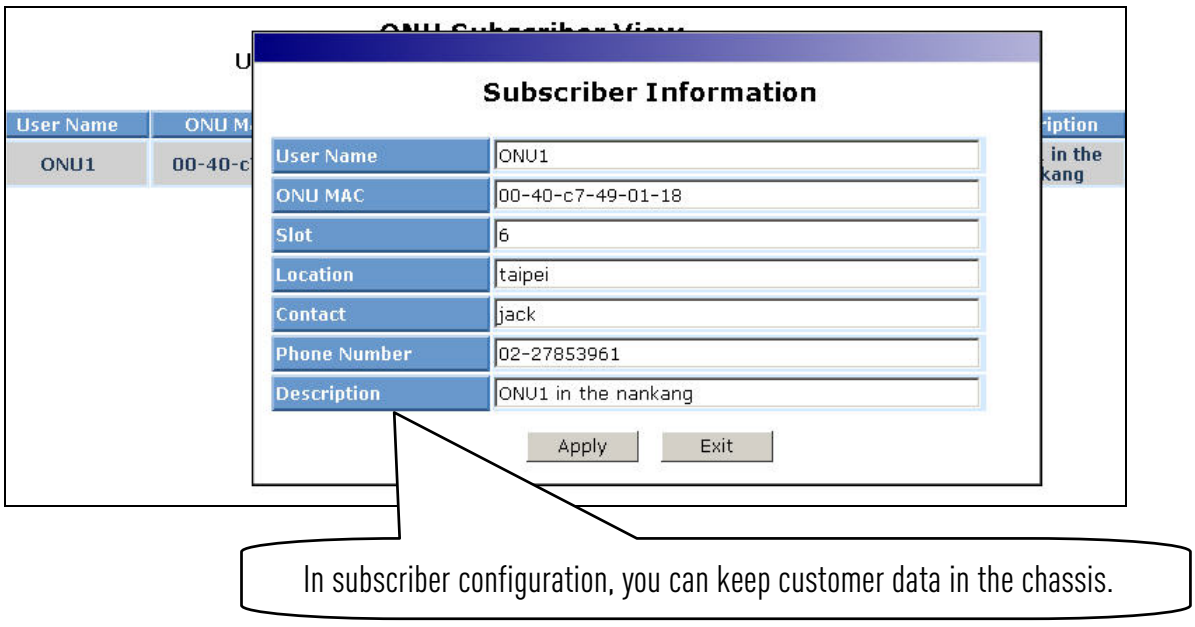
Phone Number

Fill in the phone number of the contact person for the remote device that the clicked slot connects.

Description

Fill in the description of the ONU device that the clicked slot connects.

If you click Edit button, Subscriber Information Dialog will be displayed. You can edit ONU subscriber information to the database . User Name and ONU Mac must be filled in.



If you select an item by mouse right-click, then click "Delete" button, the item related ONU information will be removed from data base.

After you click "Delete" button, the above picture would be changed as the picture below.

After you set up subscriber database, you can memorize User Name instead of ONU Mac Address. If you use command that needs MAC parameter, you can use User Name in place of ONU Mac Address. It usually is applied to CLI. You can refer to 4-2-3-C4 Bridge Mode.

ONU Subscriver View Has many pages. Each page has 64 entries.You select Page X to go to Xth page.

Parameter description:

Slot Change

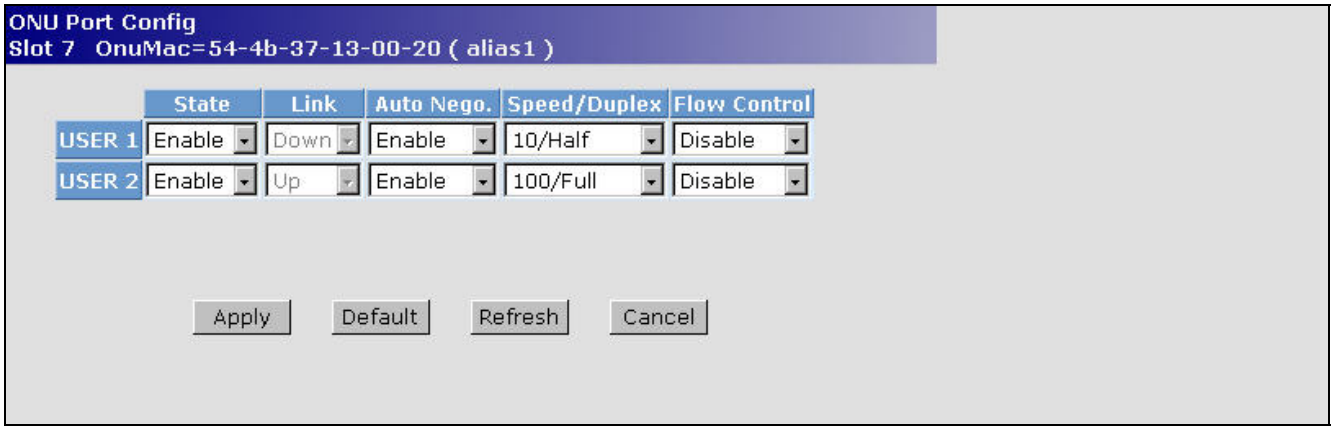
Go to Slot Change function page. You can change ONU slot field to another slot in Subscriber View. e.g. There is ONU named ONU1 in Slot 6. If you want to change Slot 6 to Slot 8. There is another ONU named ONU2 in Slot 6. If you also want to change Slot 6 to Slot 8. You can use Slot change function. Update Subscriber ONU slot field from 6 to 8.

CENTRAL DE SERVIÇOS AO CLIENTE
0800 412100

3-3-2 Port Config

Function description:

Status and configuring dialogue box for the UNI ports on an ONU.<Default> button reload the factory default setting to the dialogue box. Configuration values will take effect when <Apply> button is clicked. <Refresh> button retrieves the latest UNI port status.



Parameter description:

Link Status

The physical link status of the ONU's UNI ports. Possible values are [Up] and [Down].UNI is the abbreviation of "User Network Interface".It connects with the subscriber's network.This parameter can not be configured.

Default: None.

State

The management status of the ONU's UNI ports .Possible values are [Enable] and [Disable].

Default: [Enable]

Auto Nego.

Auto Negotiation status of the ONU's UNI ports. Possible values are [Enable] and [Disable]

Default: [Enable]

Speed/Duplex

Line speed and duplex mode of the ONU's UNI ports.Possible values for UNI port 1 (USER 1 in the dialogue box) are [1000/Full] [100/Full] [100/Half] [10/Full] [10/Half].

Possible values for UNI port 2 (USER 2 in the dialogue box) are [100/Full] [100/Half] [10/Full] [10/Half].

Default: [1000/Full] for USER 1; [100/Full] for USER 2.

Flow Control

IEEE802.3x Pause flow control state of the ONU's UNI ports. Possible values are [Enable] and [Disable]

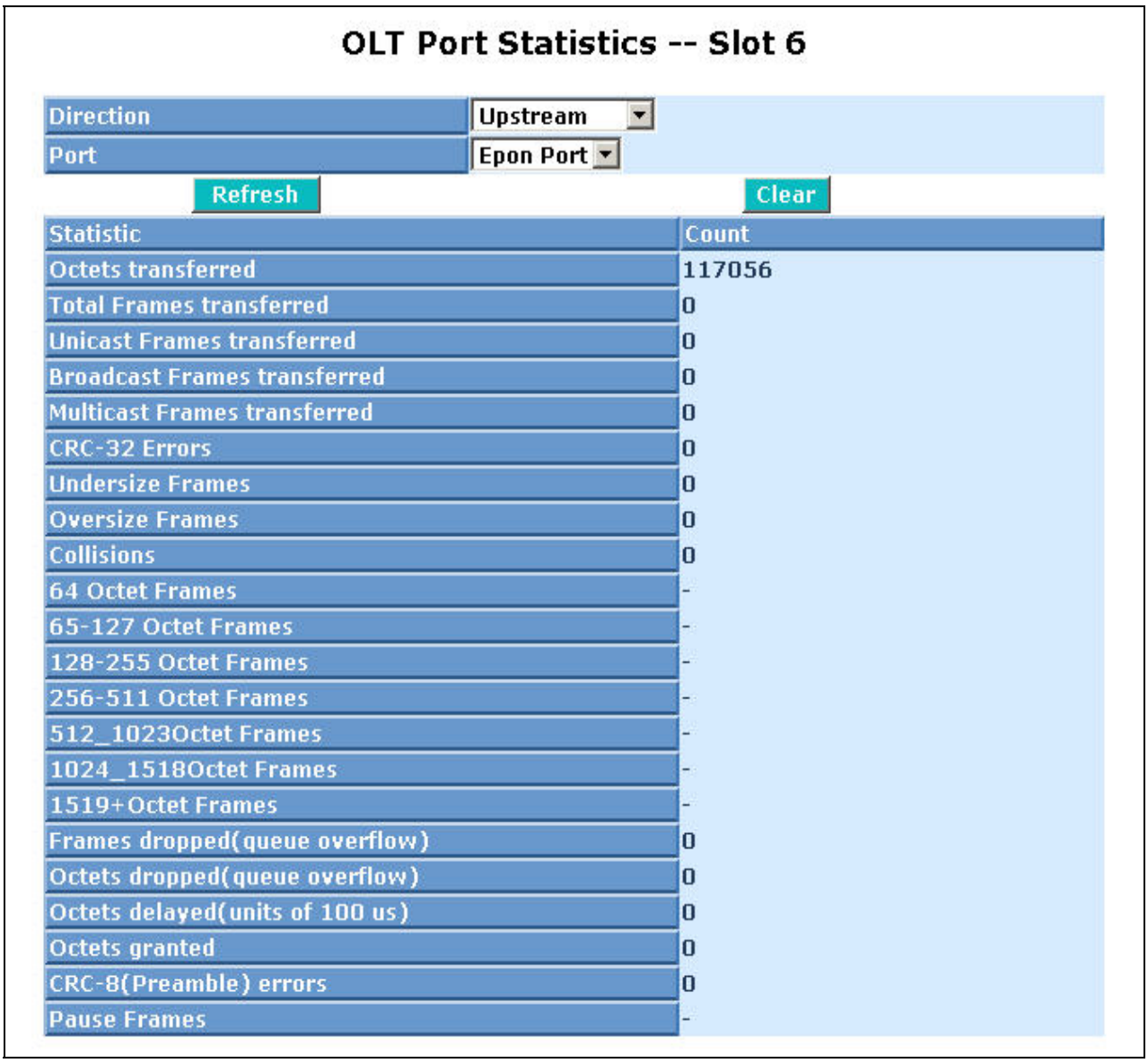
Default: [Disable]

CENTRAL DE SERVIÇOS AO CLIENTE
0800 412100

3-3-3 ONU Statistics

Function description:

Requests statistics related to the specified ports which including Epon port, UNI port1 and UNI port2. The direction includes upstream and downstream. If you click Refresh button, the statistics information will be displayed. If you click Clear button, the statistics information will be cleared. Upstream direction reflects the traffic from UNI port to Epon port. Downstream direction reflects the traffic from Epon port to UNI port.



OLT Port Statistics -- Slot 6

Direction	Upstream
Port	Epon Port

Refresh Clear

Statistic	Count
Octets transferred	117056
Total Frames transferred	0
Unicast Frames transferred	0
Broadcast Frames transferred	0
Multicast Frames transferred	0
CRC-32 Errors	0
Undersize Frames	0
Oversize Frames	0
Collisions	0
64 Octet Frames	-
65-127 Octet Frames	-
128-255 Octet Frames	-
256-511 Octet Frames	-
512_1023Octet Frames	-
1024_1518Octet Frames	-
1519+Octet Frames	-
Frames dropped(queue overflow)	0
Octets dropped(queue overflow)	0
Octets delayed(units of 100 us)	0
Octets granted	0
CRC-8(Preamble) errors	0
Pause Frames	-

3-3-4 ONU Information

Function description:

A detailed description about an ONU.

ONU Information
Slot=11. OnuMac=00-40-c7-49-01-10

Model Name	ONU-TE01
Serial Number	011C01000010
Output Optical Center Wavelength (nm)	1310
Min. TX Power (dBm)	0
Max. TX Power (dBm)	4
Min. RX Operating Wavelength (nm)	1480
Max. RX Operating Wavelength (nm)	1500
RX Sensitivity (dBm)	-26
RX Saturation Power (dBm)	-3
Mac Address	00-40-c7-49-01-10
Firmware Version	0x141
Chip ID	0x3713
Chip Version	0xa0050225
Boot Code Version	0x93
Personality Version	f8
App0 Version	0x141
App1 Version	0x141

Parameter description:

ONU optical Transceiver information

Output Optical Center Wavelength(nm)

Min. TX Power (dBm)

Max. TX Power (dBm)

Min. RX Operating Wavelength (nm)

Max. RX Operating Wavelength (nm)

RX Sensitivity (dBm)

RX Saturation Power (dBm)

ONU identity

CENTRAL DE SERVIÇOS AO CLIENTE
0800 412100

Mac Address

The globally unique Mac Address of an ONU. The Mac Address is primarily used within an EPON system to identify the ONU.

Firmware Version

The version number of the (app)firmware currently running on the ONU EPON chip.

Chip ID

The EPON chip type of the ONU.

Chip Version

The hardware version number of the EPON chip inside the ONU.

Boot Code Version

the firmware version number of the bootstrap code residing in the ONU EPON chip.

Personality Version

Personality is an area in the flash memory inside the ONU.This non-volatile memory keeps the most basic and default provisioning information of an ONU. When an ONU boots up,some provisioning information must be fetched from the personality area.

App0 Version

App1 Version

Two memory areas are allocated within the ONU flash for the redundant storing of the EPON application firmware. App0 is the primary one.If app0 is crashed and unable to be loaded, app1 will be the backup.When one application firmware load crashing is detected, the backup load will be automatically replicated to keep the redundancy.

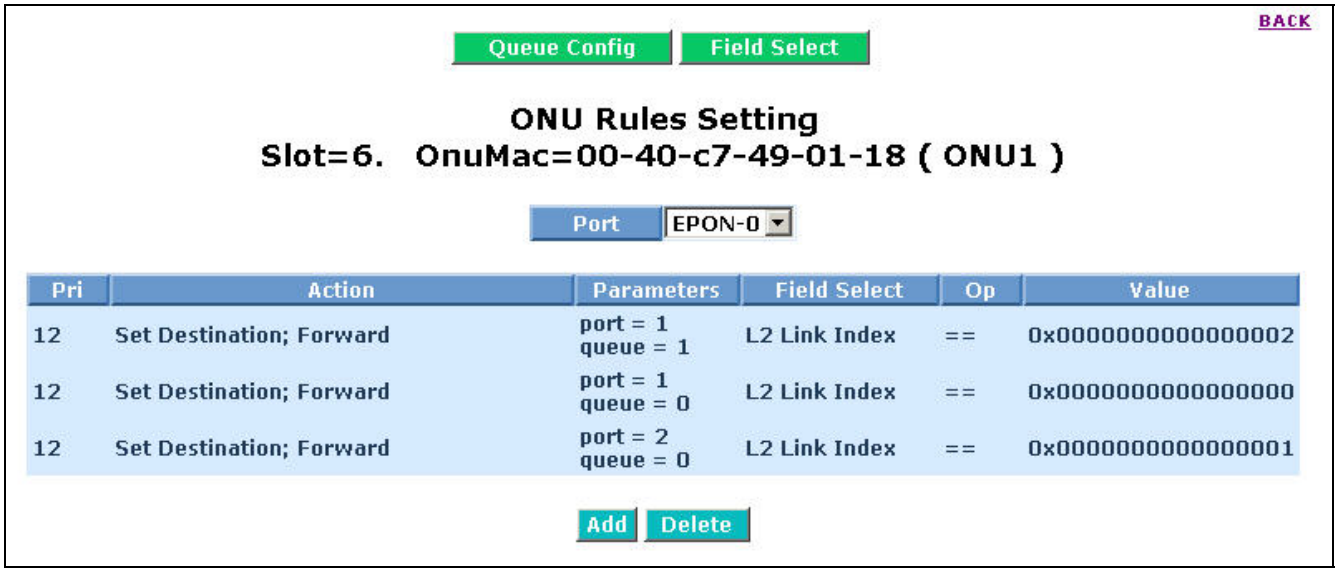
3-3-5 ONU Traffic Management

3-3-5-1 Rules Setting

Function description:

The Rules Setting shows ONU traffic information that includes rule Priority, Action, Parameters, Field Select, Op, Value. You can control the user data flow by setting the rules. Classification is the process of deciding which frames are forwarded to particular queues and passed through the ONU. Filtering is the process of deciding which frames should be dropped, and not passed through the ONU. An ONU has a Queue Configuration, which describes the number and sizes of queues in use, as well as their connectivity to user ports and EPON logical links. An ONU also has a classification scheme, which is a set of rules describing how traffic is forwarded to priority queues in either direction, and possibly a set of filtering rules to control access to the PON.

The concept about Rule Setting is attached on Appendix A Chapter 1.

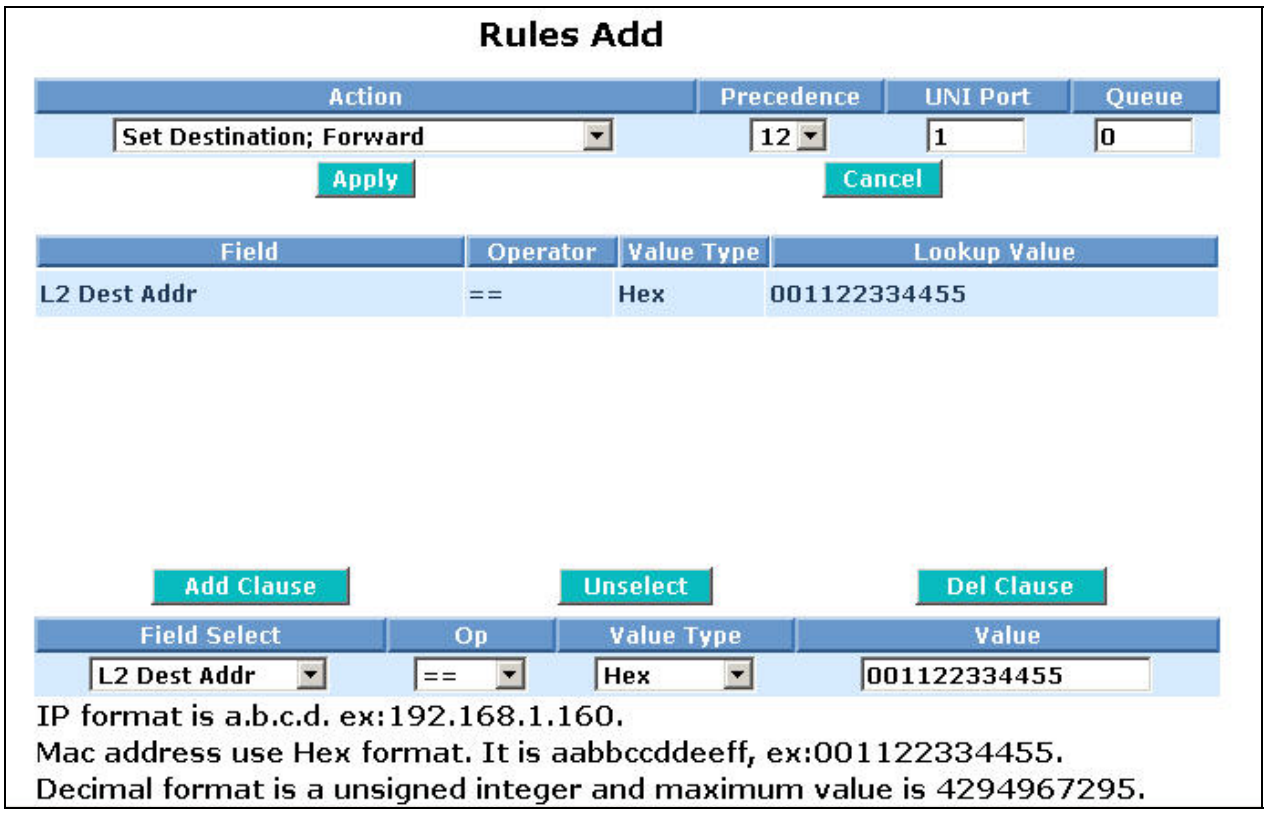


The above picture shows three entities:

1. data forwarded to port 1 and queue index 0 when Link Index is equal to 0
2. data forwarded to port 2 and queue index 0 when Link Index is equal to 1
3. data forwarded to port 1 and queue index 1 when Link Index is equal to 2

CENTRAL DE SERVIÇOS AO CLIENTE
0800 412100

The value in Port combobox is EPON-0. It reveals the information that source port is Epon port. It represents downstream. If the Port combobox is User-1 or User-2, It reveals the information that source port is UNI port. It represents upstream. In ONU, the port 0 is represent as Epon port, and the port 1,2 is represented as UNI port. In OLT, the port 0 is represent also as Epon port, and the port 1 is represented as CNI port. You may set frame destination and forward frames, to form classification rules. You may also discard selected frames, as filter rules. if you click Add button, ONU Rules Add Information is displayed below.



The clause can be added by clicking Add Clause button. The maximum clause number is eight for single rule. By clicking Add Clause button, you can add a clause. You can delete a clause by selecting a item and click Del Clause button.

Parameter description:

Action

The rule action is the action(s) taken upon the frame if all clauses of the rule are true. For example, rules might set the destination queue for a frame, might add a VLAN tag, or might discard the frame.

Precedence

The implemented precedence values for the TK3713 range from 0..15. Lower numbers represent higher precedence rules; 0 is the highest precedence possible.

Action Parameter

Some actions have additional parameters, as noted below. Rules with other actions should set this field to zero.

1. Action = Set Destination

Parameter 1 = EPON Link index (upstream) 0..n-1 or UNI Port (downstream) 1..n

Parameter 2 = Queue (relative to link/port) 0..n-1

2. Action = Set VID

Parameter 1 = VID (bits 11:0)

3. Action = Set COS

Parameter 1= COS (bits 2:0)

Field Select

Field selectors describe fields in Ethernet frames that can be matched in rules.

Op (operator)

value	symbol	description
0	F	Never match
1	==	Field Equal to value
2	!=	Field Not equal to value
3	<=	Field Less than or equal to value
4	>=	Field Greater than or equal to value
5	exists	True if field exists (value ignored)
6	!exist	True if field does not exist (value ignored)
7	T	Always match

Value Type

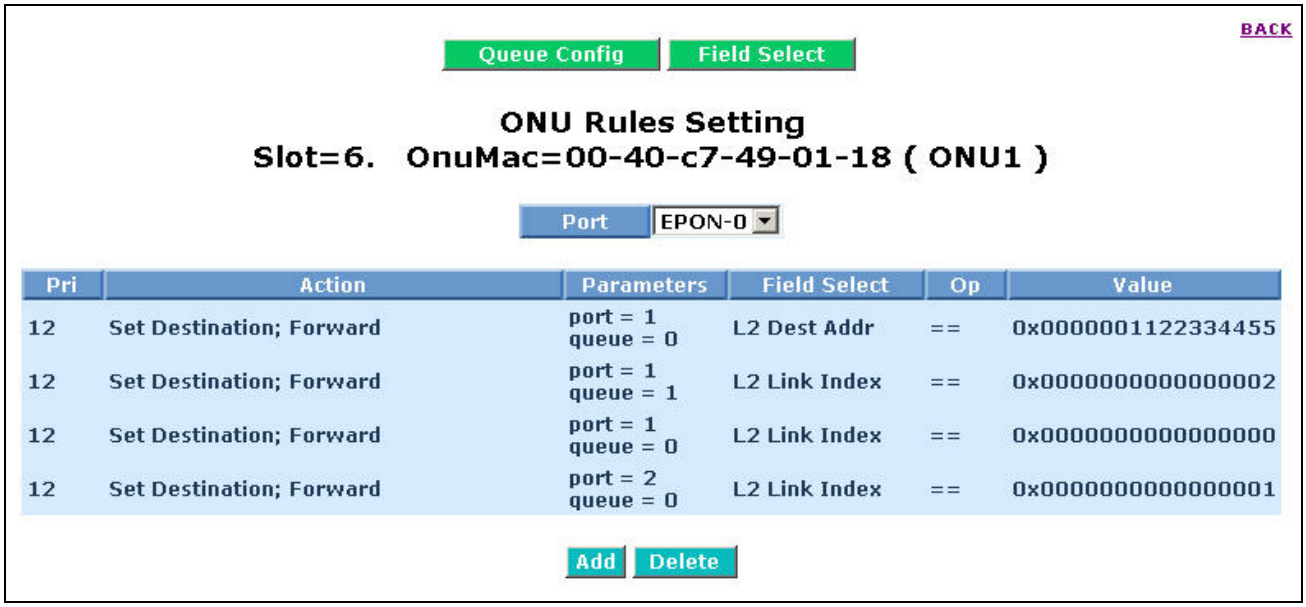
CENTRAL DE SERVIÇOS AO CLIENTE
0800 412100

It includes 3 types. Hex, Decimal and IP format. When field is IPv4 DA or IPv4 SA , you must select IP format type. When field is L2 Dest Addr, you must select Hex type. Whne field is Eth VID, you must select Decimal type.

Value

Value describe look-up value in Ethernet frames that can be matched in rules.

If you set up the rule and click Apply button, the result is shown below.



You add a rule that forward port 1 queue 0 when Dest Addrress equal 0x001122334455.

If port 1 has 2 queues, the queue index is 0 and 1. If port 0 has 4 queues, the queue index is 0,1,2 and 3. Set up queue number and queue size, please refer to Queue Config.

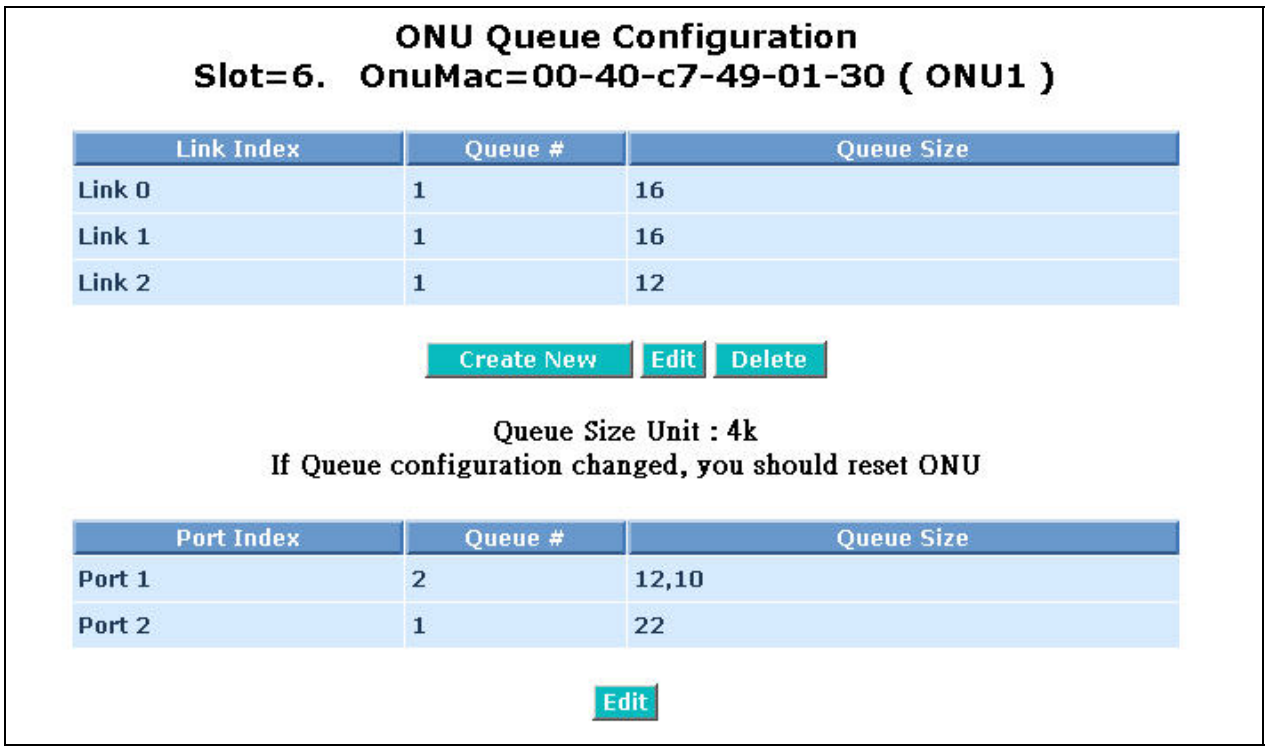
If you set up a rule and wouldn't like to apply, you may click cancel button and give up the rule.

3-3-5-2 Queue Configuration

Function description:

This command configures the upstream and downstream queues on the ONU. The upstream queues hold frames destined for the Logical Links, the downstream queues for the UNI Ethernet ports. Queue sizes are specified in the order of queue priority, where the first queue has the highest priority. Note that the Queue Configuration command causes any existing Classification rules on the ONU to be invalidated. Therefore a Queue configuration change should always be followed by Classification commands to re-install the required classification rules. Filtering rules on the ONU remain in place.

The message above consists of two configuration sections: upstream and downstream. Links are configured in the upstream section of the message, where each link can be assigned one or more queues. The downstream section specifies port configuration, where each port can be assigned one or more queues.



The above picture display three LLID.

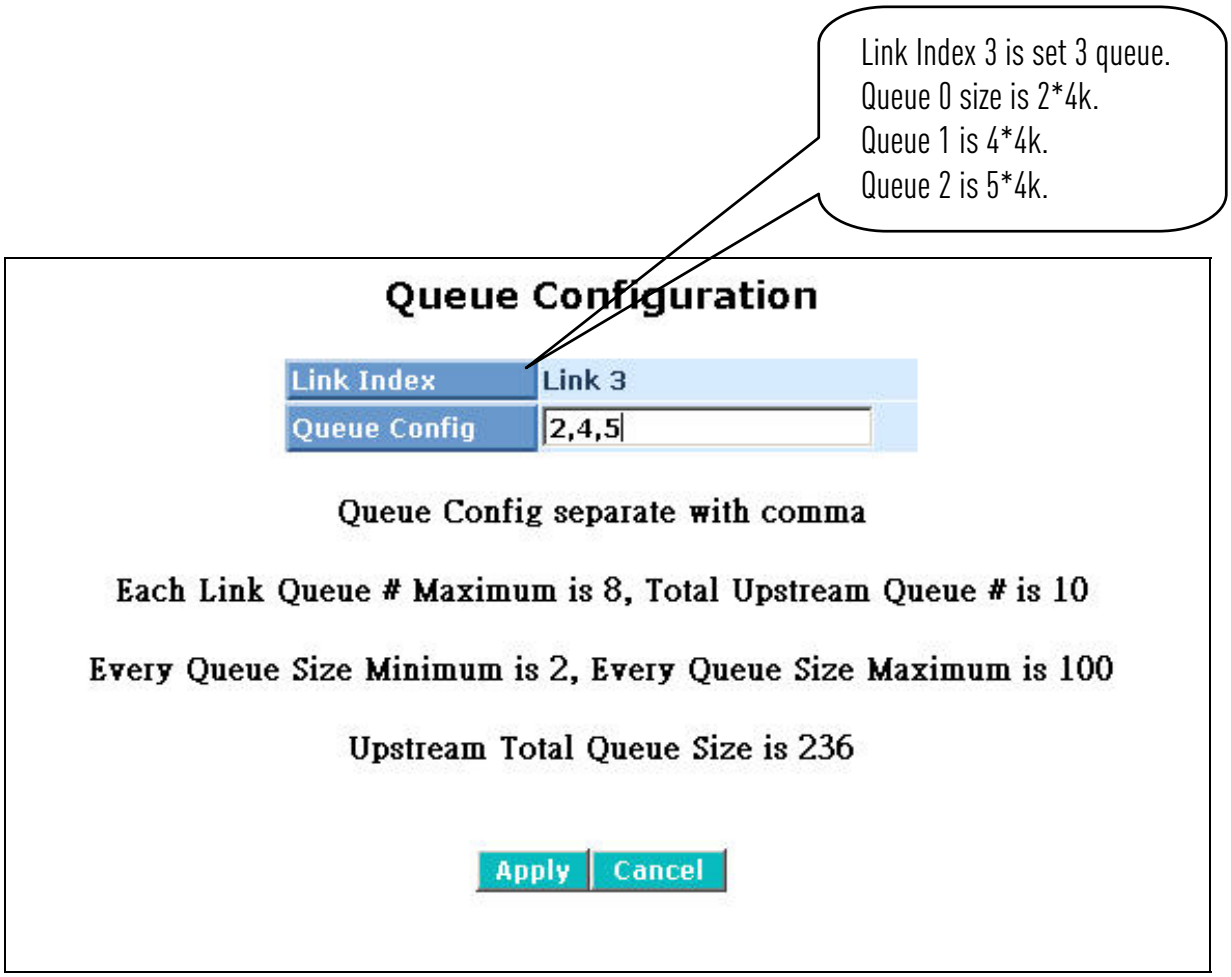
- Link Index 0 has one queue and queue size is 16*4k .
- Link Index 1 has also one queue and queue size is 16*4k.
- Link Index 2 has one queue and queue size is 12*4k.

The three Link Index represent upstream.

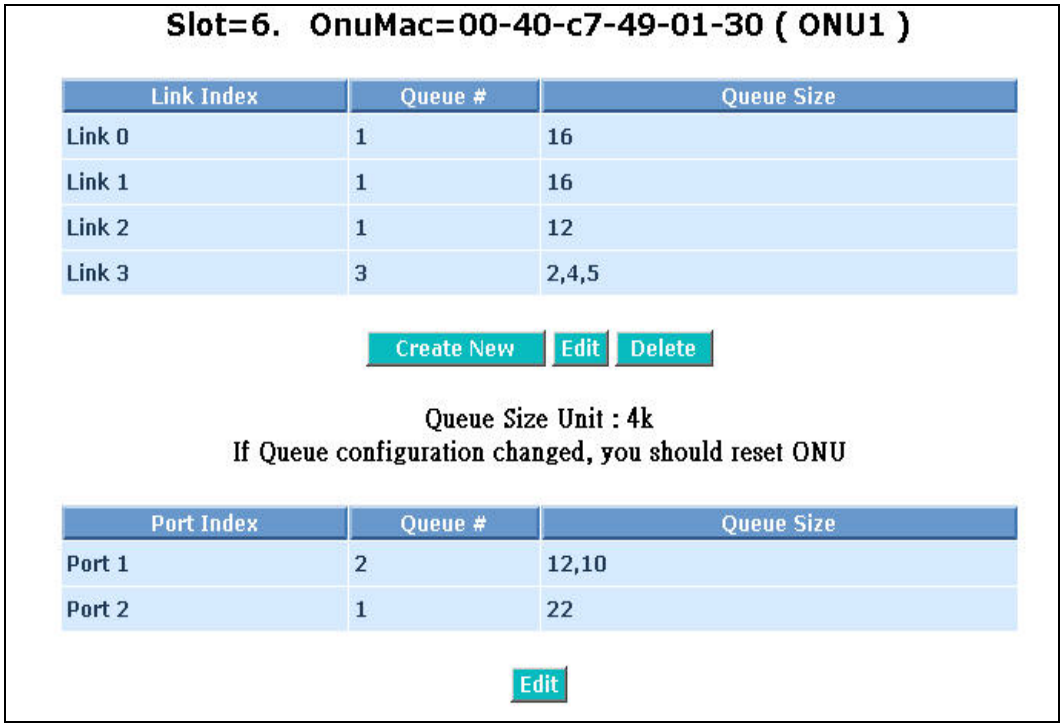
CENTRAL DE SERVIÇOS AO CLIENTE
0800 412100

- Port 1 has two queues and queue size is 12*4k and 10*4k.
- Port 2 has one queue and queue size is 22*4k.

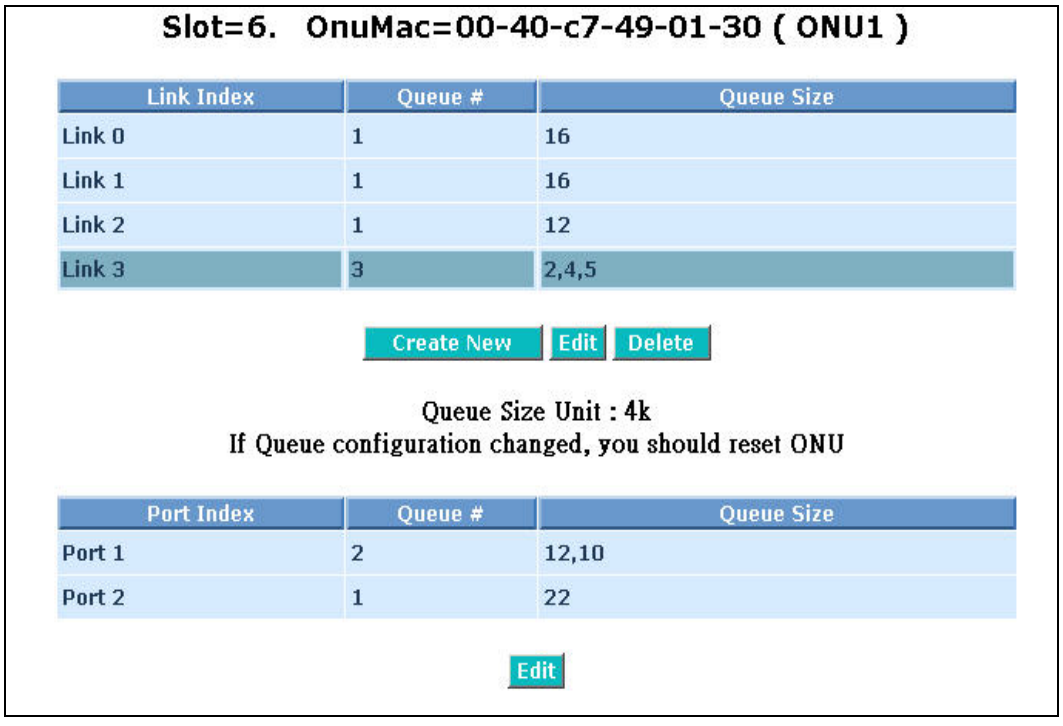
The two ports represent downstream. If you click on "Create New" button, you create one new LLID. The port can't be created new on Port Index table. The maximum port in the 3713 ONU is two.
If you click on "Create New" button, Link Index 3 Queue Configuration will be displayed below.


Link Index 3 is set 3 queue.
Queue 0 size is 2*4k.
Queue 1 is 4*4k.
Queue 2 is 5*4k.
Queue Configuration
Link Index
Link 3
Queue Config
2,4,5
Queue Config separate with comma
Each Link Queue # Maximum is 8, Total Upstream Queue # is 10
Every Queue Size Minimum is 2, Every Queue Size Maximum is 100
Upstream Total Queue Size is 236
Apply
Cancel

If you changed setting as the above picture then click "Apply" button. The result is shown on next page.



If you click Link 3 item. The result is shown below. The Link 3 item is selected.



Then you can click Edit button and enter into Editing Queue Configuration, or click Delete button and delete Link 3 item.

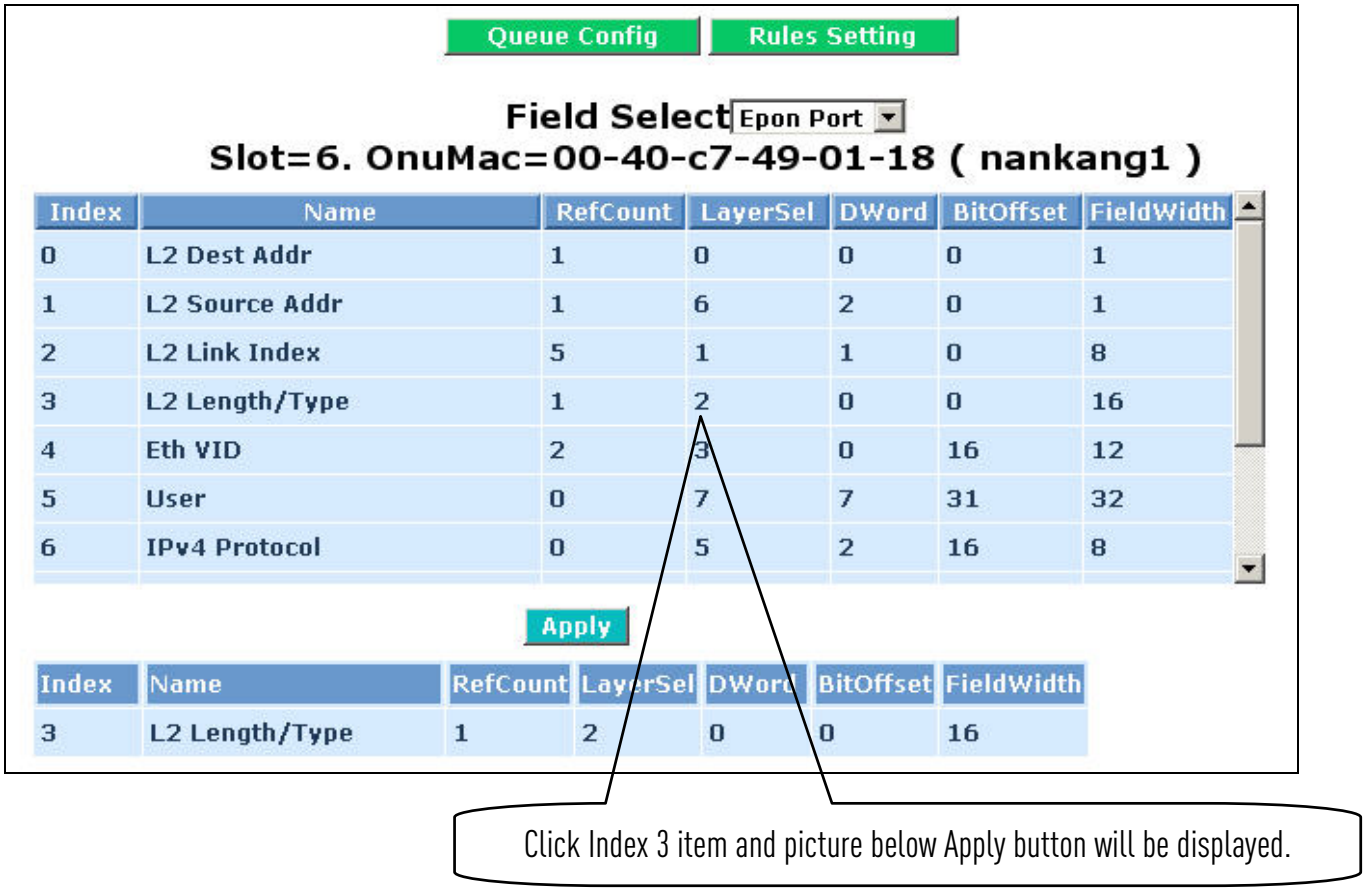
CENTRAL DE SERVIÇOS AO CLIENTE
0800 412100

3-3-5-3 Field Select

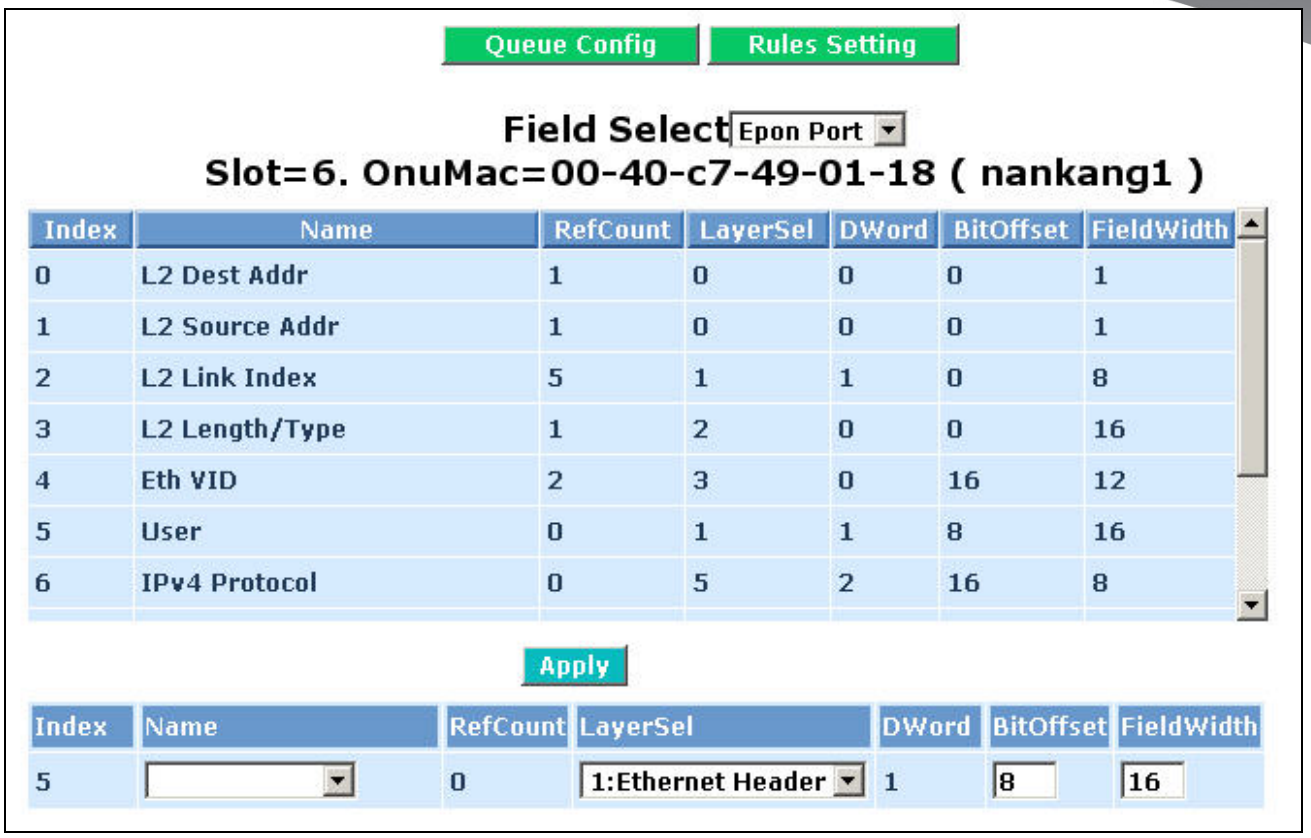
Function description:

This command sets the fields parsed from each frame which are used in lookup engine rules to filter or classify frames. Each port on the ONU has a lookup engine (LUE) that processes frames received on that port. Each lookup engine has a number of field selectors supported in the hardware. Each field is programmed with a field code that describes the field parsed from the frame in terms of protocol layer, dword in the frame, bit start, and bit width.

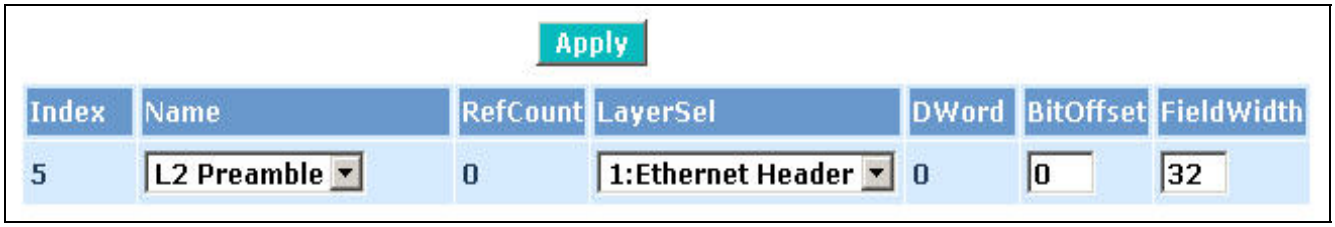
The current programming of each field is described. The Reference Count indicates the number of clauses in rules that are currently using this field. If the field is currently unused, the reference count will be zero, and the layer select, dword offset, bit offset, and bit width will contain the maximum possible values for that field on that ONU. Fields with a non-zero reference count can **not** be reprogrammed with the Set message. All rules using a given field must be deleted before the meaning of that field is changed. Note that hardware and firmware system rules will also use fields in the LUE. These rules cannot be deleted, and so it is possible that some reference counts will never go to zero.The detail about Field Select is attached on Appendix A Chapter 1.


Queue Config
Rules Setting
Field Select
Epon Port
Slot=6. OnuMac=00-40-c7-49-01-18 (nankang1)
Index Name RefCount LayerSel DWord BitOffset FieldWidth
0 L2 Dest Addr 1 0 0 0 1
1 L2 Source Addr 1 6 2 0 1
2 L2 Link Index 5 1 1 0 8
3 L2 Length/Type 1 2 0 0 16
4 Eth VID 2 3 0 16 12
5 User 0 7 7 31 32
6 IPv4 Protocol 0 5 2 16 8
Apply
Index Name RefCount LayerSel DWord BitOffset FieldWidth
3 L2 Length/Type 1 2 0 0 16
Click Index 3 item and picture below Apply button will be displayed.

If you click Index 5 item, the picture is shown below.



Index 3 item RefCount is not zero. It is not editable. Index 5 item RedCount is zero and so it is editable. You can change Index 5 Field Name. If you select L2 Preamble in Name field, BitOffset and FieldWidth is changed as Name field change. You may also select VLAN/L2-Frame or other in LayerSel field. First you select LayerSel value in LayerSel field and then select Name calue in Name field. BitOffset and FieldWidth is changed as Name field change finally.



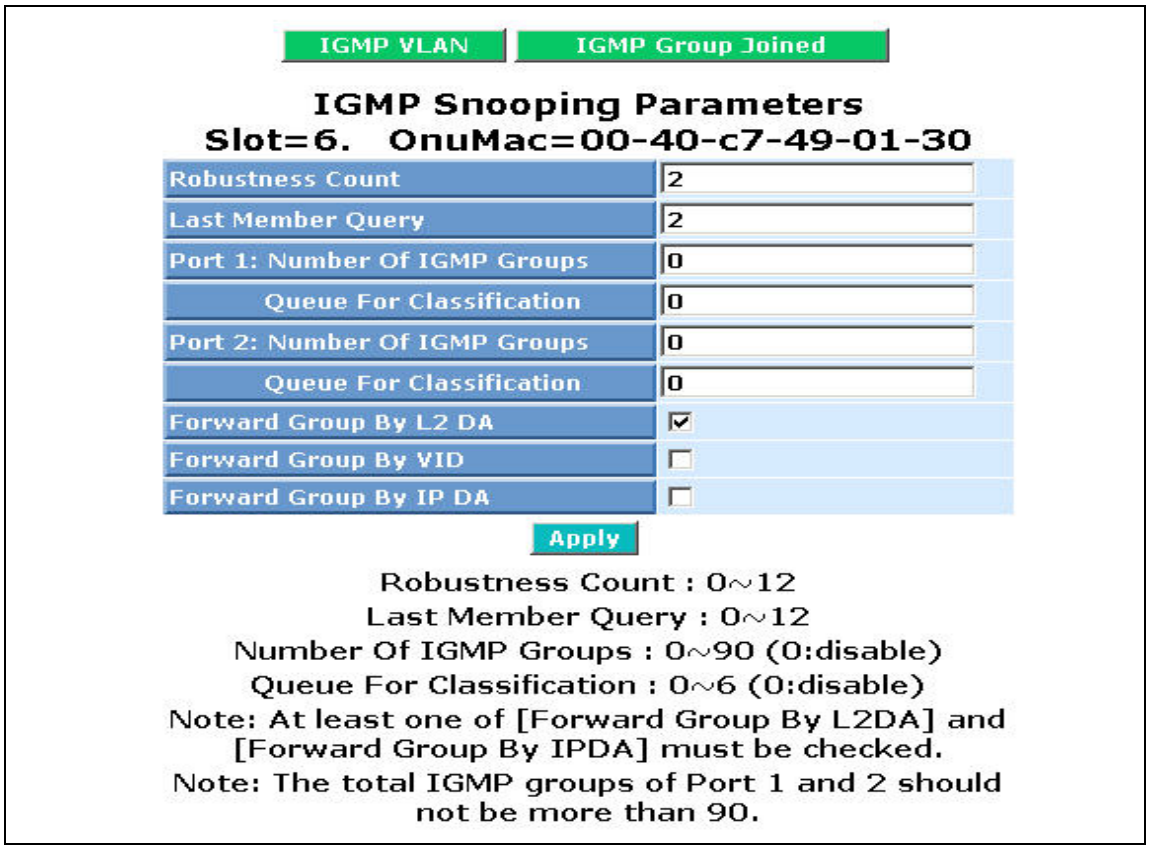
If your selection is finished, click Apply button. The new field is added to system.
The result is shown below.

CENTRAL DE SERVIÇOS AO CLIENTE
0800 412100

3-3-6 ONU IGMP Snooping

This session describe how to configure IGMP snooping and some IGMP VLAN setting. The detail about ONU IGMP is attached on Appendix A Chapter 5.

3-3-6-1 IGMP Snooping Parameters


IGMP VLAN
IGMP Group Joined
IGMP Snooping Parameters
Slot=6. OnuMac=00-40-c7-49-01-30
Robustness Count
2
Last Member Query
2
Port 1: Number Of IGMP Groups
0
Queue For Classification
0
Port 2: Number Of IGMP Groups
0
Queue For Classification
0
Forward Group By L2 DA
Forward Group By VID
Forward Group By IP DA
Apply
Robustness Count : 0~12
Last Member Query : 0~12
Number Of IGMP Groups : 0~90 (0:disable)
Queue For Classification : 0~6 (0:disable)
Note: At least one of [Forward Group By L2DA] and [Forward Group By IPDA] must be checked.
Note: The total IGMP groups of Port 1 and 2 should not be more than 90.

This command is general IGMP Snooping configuration, which has four parameters Robustness Count, Last Member Query, Number of IGMP Groups (for port 1 and port 2), and Queue for Classification (for port 1 and port 2). The ONU does not need to be explicitly provisioned, because the ONU obtains many values by snooping. The Query maximum response times are snooped from the query messages generated by the OLT. The ONU measures the interval between snooped General Queries to detect the General Query Interval of network Query.

Parameter description:

Robustness Count

The Robustness Count is the number of IGMP General Queries. The query may pass with no corresponding IGMP Report reply before a Groups is removed. So if Robustness Count is set 0, the group will be removed when it does not get any respond.

Range: 0~12

Default: 2

Last Member Query

If the Group exists, the Last Member Query represents the number of IGMP Group Specific Queries that may pass with no corresponding IGMP Report reply.

Range: 0~12

Default: 2

Number Of IGMP Groups

This parameter is set per port. The number of IGMP Groups means how many Groups can add in this port. If the number of IGMP Groups is set 0, that means disabled IGMP snooping, and all IGMP requests will be sent.

Range: 0~90 (0:disable)

Default: 0

Queue For Classification

This parameter can decide how many Queue used for classification of downstream IP multicast traffic.

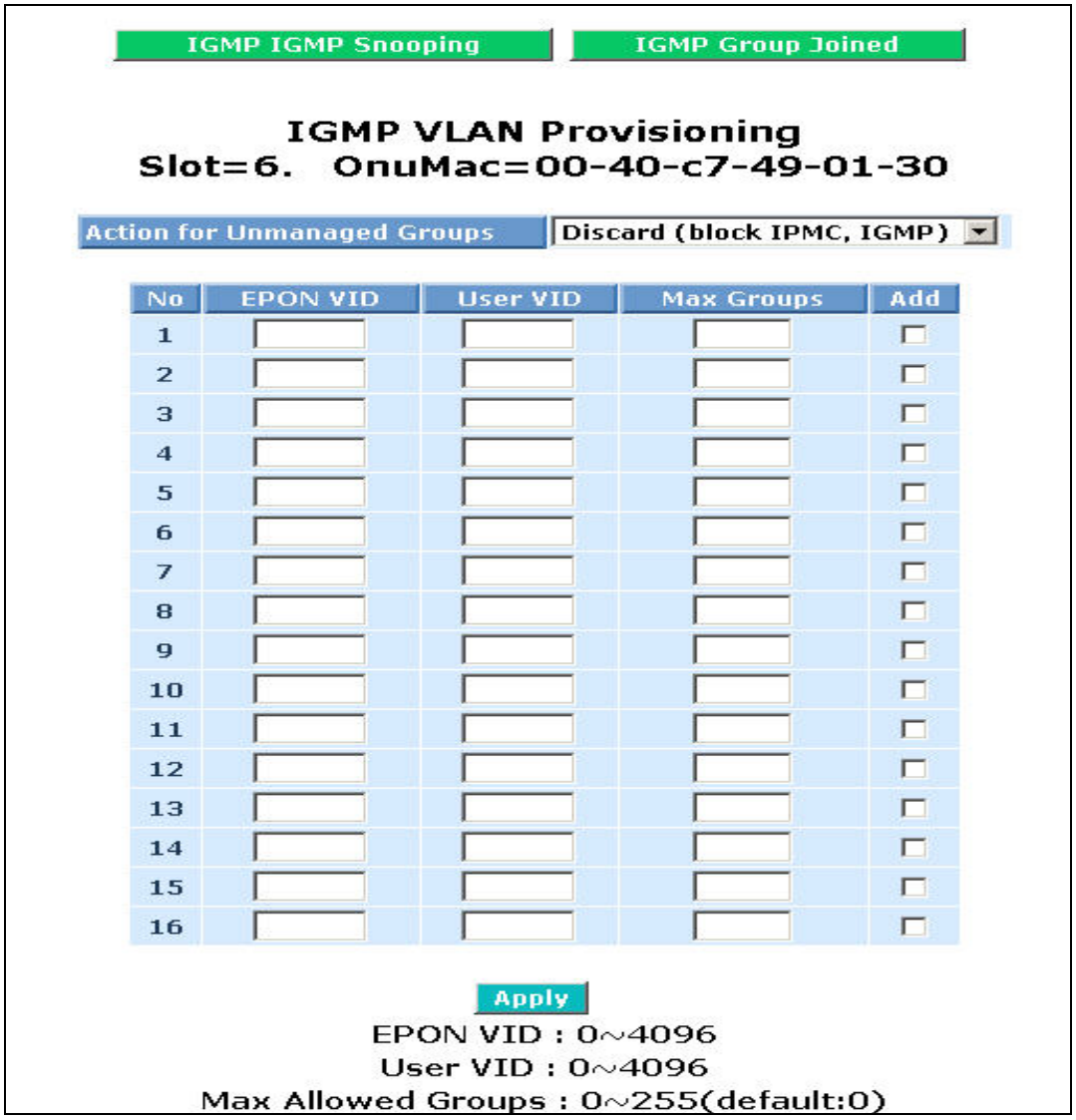
Range: 0~6 (0:disable)

Default: 0

CENTRAL DE SERVIÇOS AO CLIENTE
0800 412100

3-3-6-2 IGMP VLAN (IGMP VLAN Provisioning)

This command can set Tag for the IPMC Frame. There are sixteen groups can be set. If the number of IGMP VLANs is in unmanaged Group, the frame will be Discard or Ignored. The "Discard" means blocking all IPMC and IGMP. The "Ignored" means forwarded data and unchanged. The ONU does not support VID translation, and the VID must be identical for VLAN.



Parameter description:

Action for Unmanaged Groups

This parameter has two choices, Discard (block IPMC, IGMP) and Ignore (forward unchanged).

EPON VID

IPMC will be sent to OLT, the frame uses EPON VID.

Range: 0~4096

User VID

The User VID is VID of IPMC, it get from ONU user port.

Range: 0~4096

Max Allowed Groups

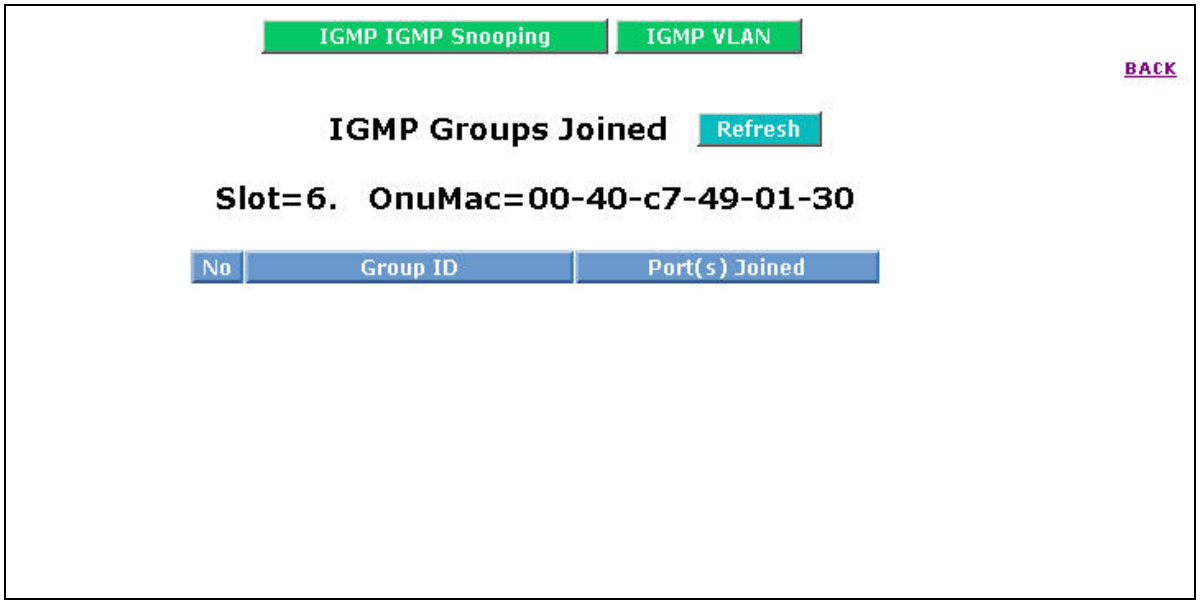
This parameter limits IGMP VLAN groups. The Max Allowed Groups is the maximum groups can be joined in each VLAN by this ONU. If the Max Allowed Groups is setting 0, the ONU will not join any groups, and will discard all IGMP frames on this VLAN.

Range: 0~255

Default: 0

CENTRAL DE SERVIÇOS AO CLIENTE
0800 412100

3-3-6-3 IGMP Group Joined



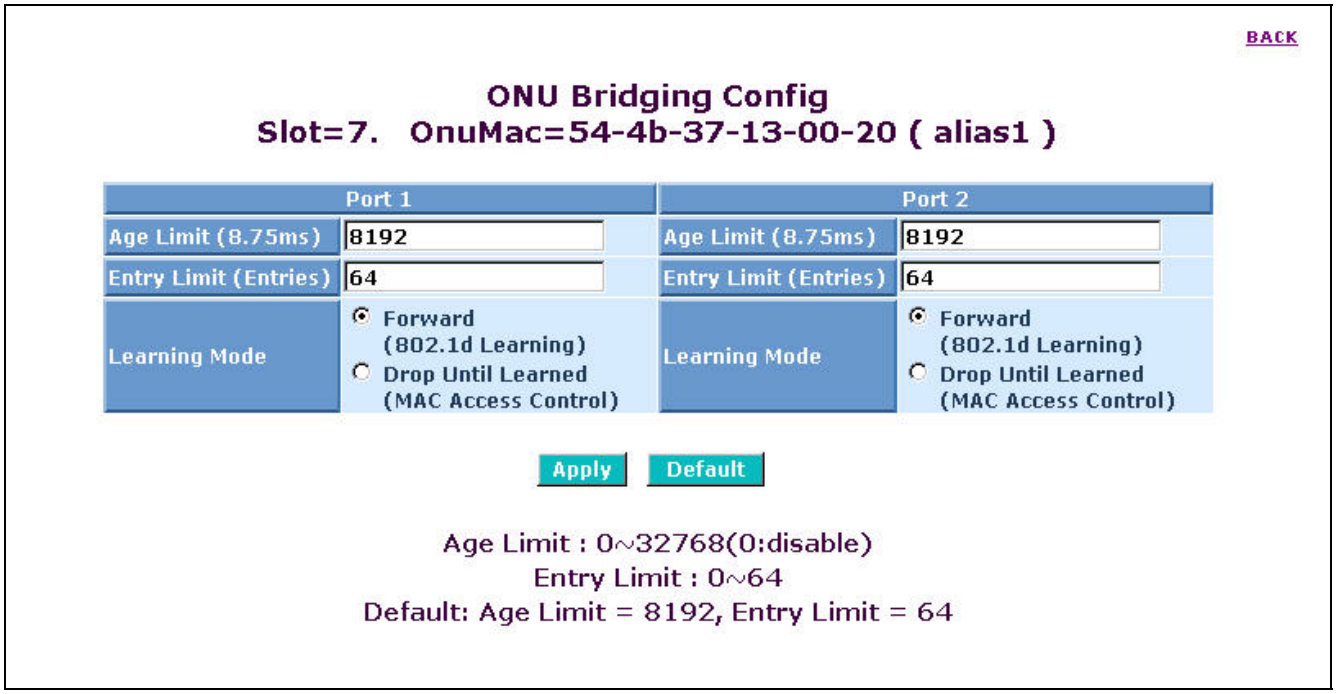
This command will show the entries in the IGMP group table. It will list the number of port and Group IP.

3-3-7 ONU Bridging Configuration

3-3-7-1 Bridging Config

This command sets MAC address learning mode of the ports on the ONU. If it is time out, the entries would be automatically removed from the table.

There are two kinds of Learning Modes, Forward (802.1d Learning) and Drop Until Learned (MAC Access Control). Forward mode forward unlearned address, which is the default behavior. Drop Until Learned means the port learns by the allowed learning entry limit, and if the frames are discarded, the MAC address will not be learned.



Parameter description:

Age Limit

An Age Limit of 0 disables aging.

Range: 0~32768 (Unit: 8.75ms) (0: disable)

Default: 8192

CENTRAL DE SERVIÇOS AO CLIENTE
0800 412100

Entry Limit

An Automatic Learning Entry Limit of zero disables address learning.

Range: 0~64

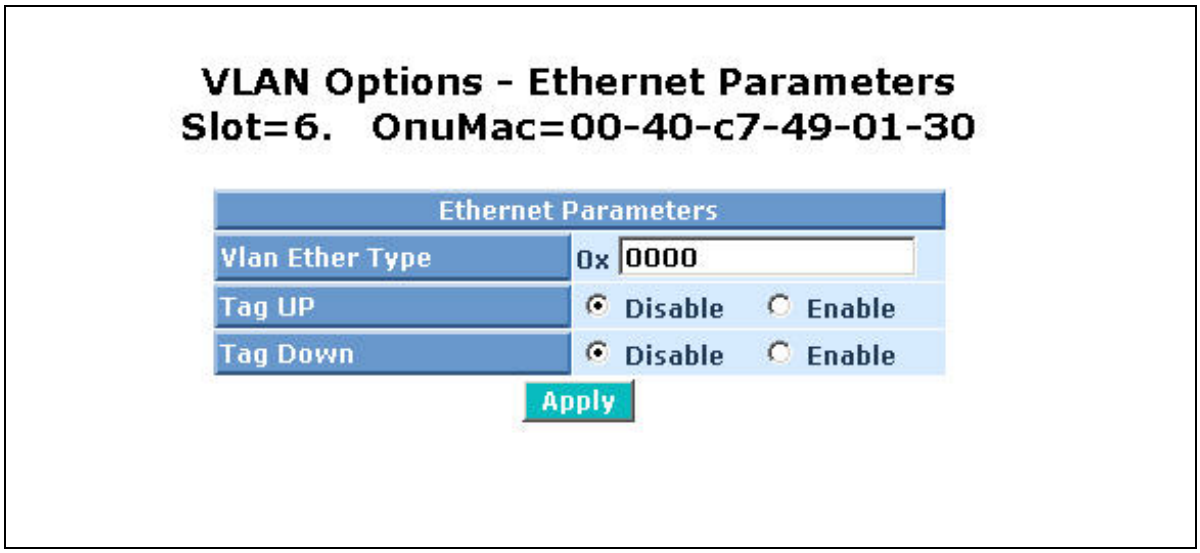
Default: 64

Learning Mode

It has two modes, Forward (802.1d Learning) and Drop Until Learned (MAC Access Control). Forward (802.1d Learning) is default mode.

3-3-7-2 IGMP VLAN Options

This command is for IGMP VLAN Ether Type options. It can set Ether Type for TAG under IGMP VLAN.



Parameter description:

VLAN Ether Type

VLAN Ether Type uses hexadecimal.

Tag UP

This parameter can set Enable or Disable.

Tag Down

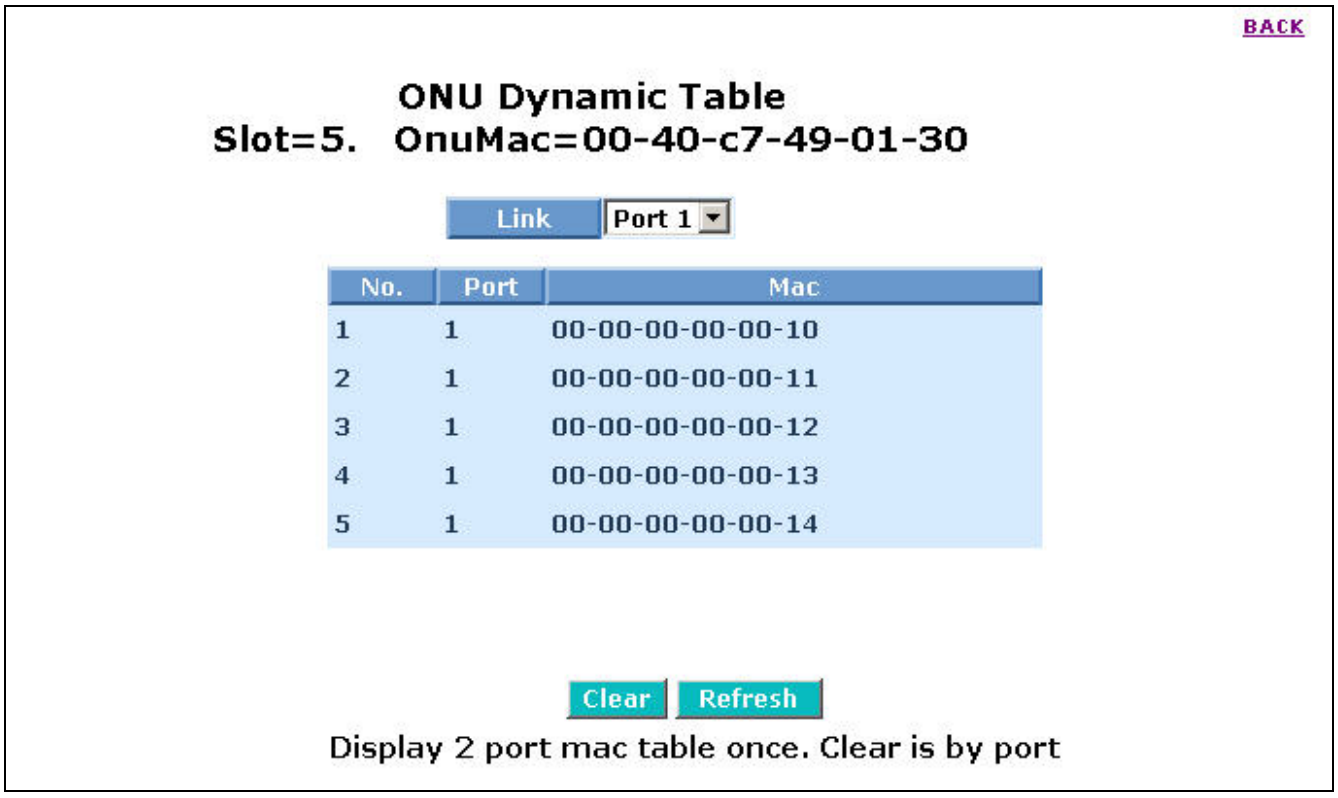
This parameter can set Enable or Disable.

3-3-7-3 ONU Dynamic Table

Function description:

Display the automatically learned MAC addresses for the selected ONU.

Clear Button can be used to clear the dynamic MAC entries for the selected port.

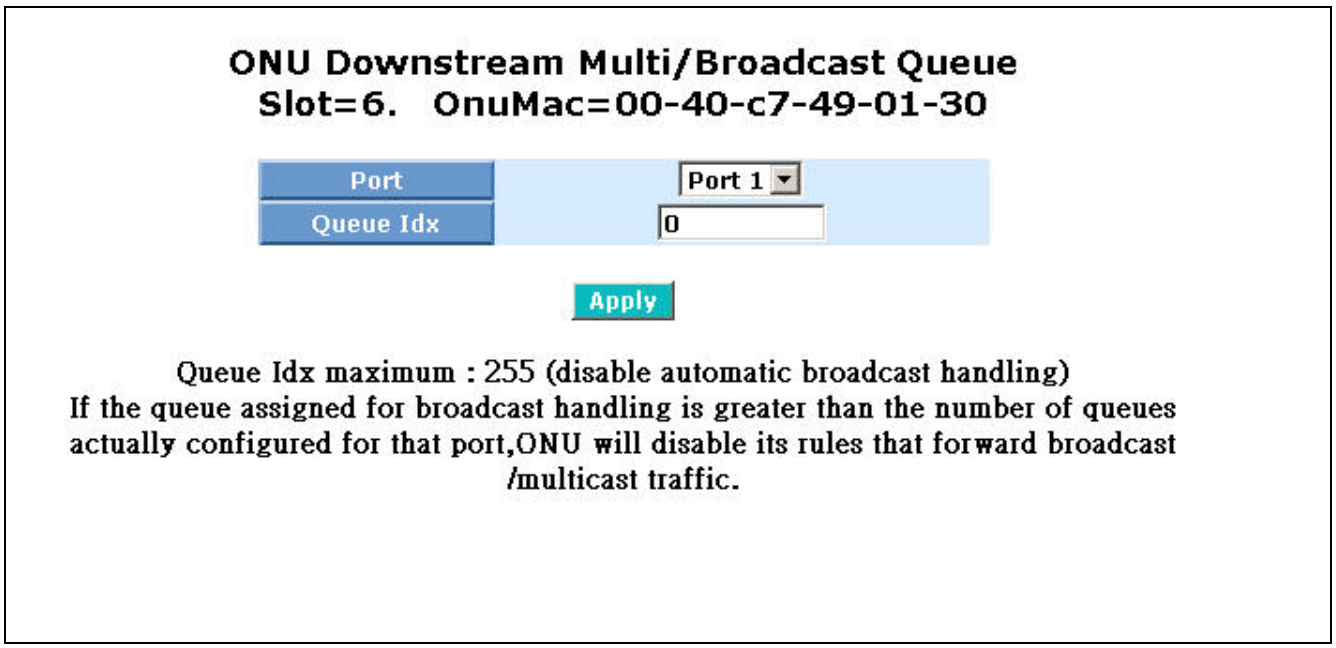


CENTRAL DE SERVIÇOS AO CLIENTE
0800 412100

3-3-7-4 ONU Broadcast Queue

Function description:

This selects the broadcast/multicast queue to be used in the downstream direction. A different broadcast/multicast queue may be selected per port. If the queue assigned for broadcast handling is greater than the number of queues actually configured for that port,ONU will disable its rules that forward broadcast/multicast traffic.


ONU Downstream Multi/Broadcast Queue
Slot=6. OnuMac=00-40-c7-49-01-30
Port
Port 1
Queue Idx
0
Apply
Queue Idx maximum : 255 (disable automatic broadcast handling)
If the queue assigned for broadcast handling is greater than the number of queues actually configured for that port,ONU will disable its rules that forward broadcast /multicast traffic.

Parameter description:

port

An Automatic Learning Entry Limit of zero disables address learning.

Range: 1~2

Queue Idx

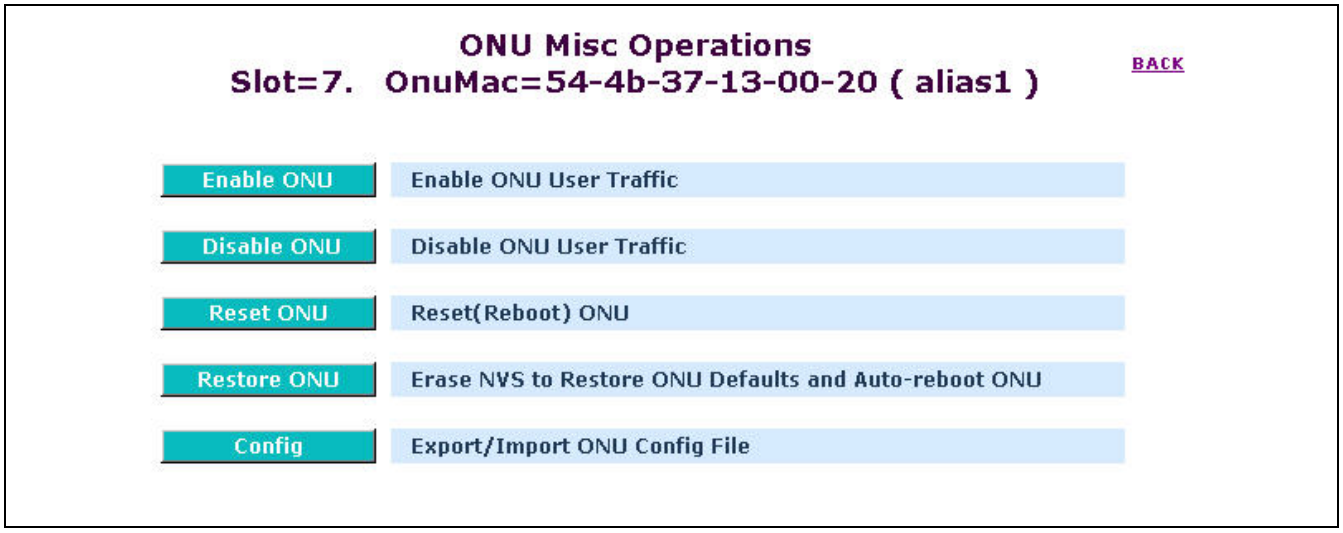
The broadcast/multicast queue index to be specified for a given port.

Range: 0~255

Default: 0

3-3-8 ONU Misc Operations

Function description:



Parameter description:

Enable ONU

Enable ONU to pass user traffic

Disable ONU

Causes the ONU to disable all user data traffic, leaving only the OAM exchange intact.

Reset ONU

Reboot ONU

Restore ONU

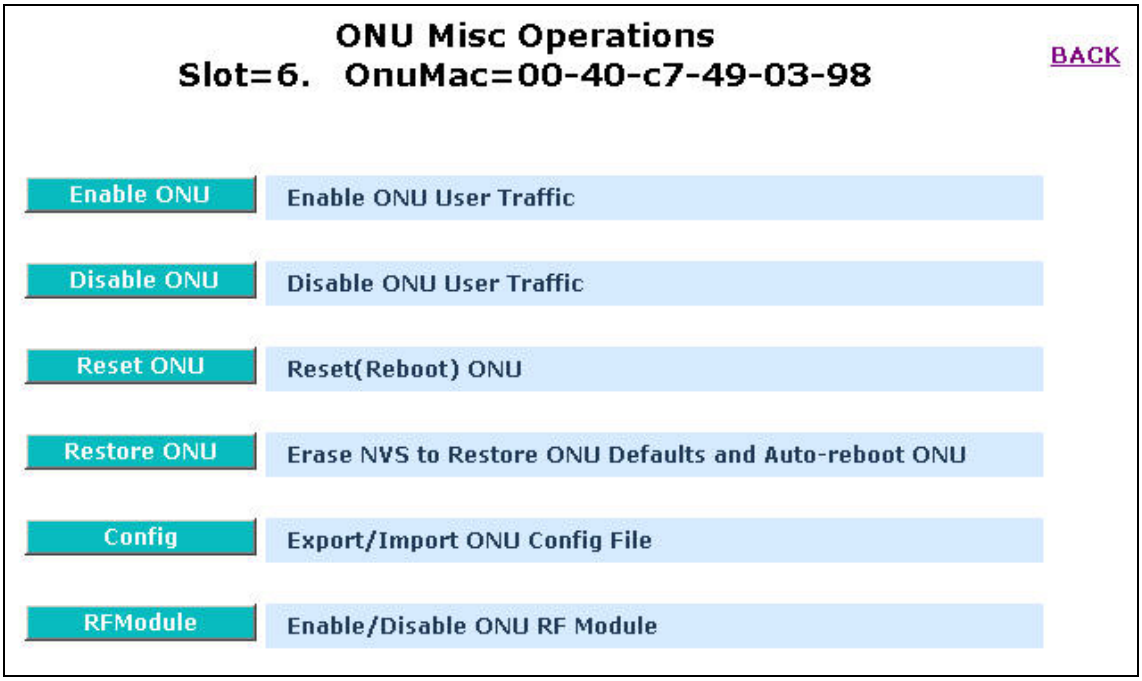
Erase all provisioning records of Non-Volatile Store (NVS) and reboot the ONU. This operation returns the operator provisioning database(e.g. ONU Traffic Management-Rule Setting) to default values. NVS is an area of flash memory inside the ONU to keep user provisioning data. It include ONU Traffic Management(Field Select, Queue Config, Rules Setting), ONU IGMP Snooping Parameters, ONU Bridging Config.

Config

Export ONU Config File -The provisioning database of the ONU can be exported out as a computer file.

Import ONU config File -This file can be used when provisioning database recovery or replication is needed.

CENTRAL DE SERVIÇOS AO CLIENTE
0800 412100



RF Module

RF Module can be enabled/ disabled. The command is delivered to RF Module by way of ONU. When the ONU with RF function is operated, ONU Misc Operations have RF Module item.

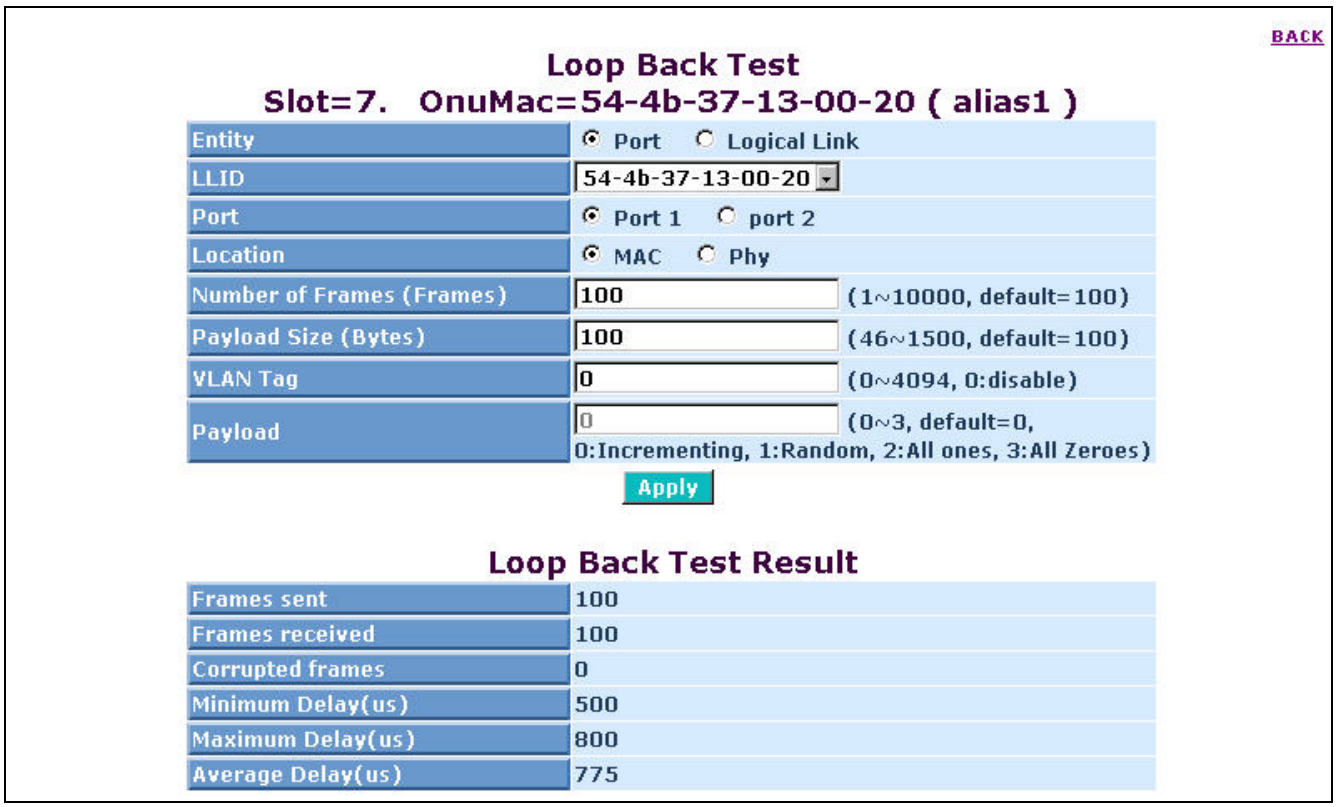
3-3-9 Loopback Test

Function description:

This is an integrated OAM loopback test procedure. It commands the OLT to perform a connectivity and link quality test on a logical link. The test involves the following steps:

(1) The OLT asks the ONU to put either a link or a UNI port (MAC or PHY) in loopback.
(2) The OLT sends special frames downstream which will be looped back upstream by the target ONU.
(3) After the requested number of frames have been transmitted and received, the OLT commands the ONU to get out from OAM Loopback mode. The target logical link rusumes user traffic service.
(4) Loopback is finished, and the result would be reported.

A logical link loopback does not affect other logical links on the same physical ONU.



CENTRAL DE SERVIÇOS AO CLIENTE
0800 412100

Parameter description:

Entity

To specify the end point on the ONU in a loopback test. Possible Values are [Port] or [Logical Link].

LLID

The Mac Address of the target logical link or Mac Address of a logical link which is connected to the target entity.

Port

If the loopback entity is [Port], the target UNI port should be specified.

Location

If the loopback entity is [Port],the target location([Mac] or [Phy])should be specified.

Number of Frames

Number of frames to transmit in a loopback test.

Payload Size(Bytes)

The size of the data portion of an Ethernet frame.

VLAN TAG

Specifies the VID of the loopback frames if frame tagging is wished.1-4094 are valid values for tagged frame loopback. 0 disable frame tagging.

Test Result

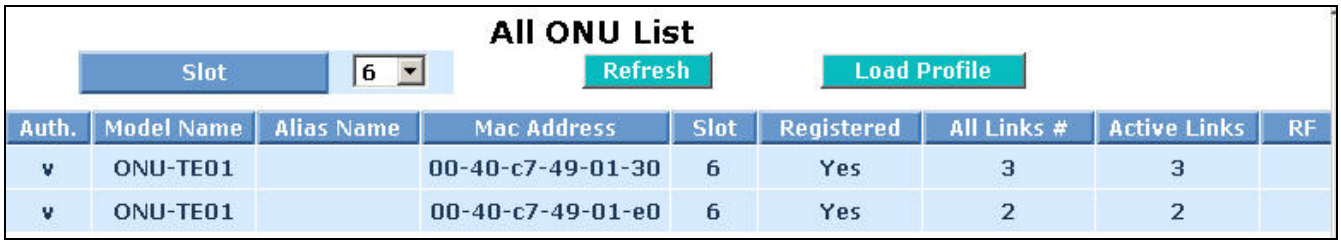
Includes [Frames sent], [Frames received OK], [Corrupted frames received], [Minimum Delay (μs)], [Maximum Delay (μs)], [Average Delay (μs)].

A frame is presumed lost if it has not returned after 1second. Delay stats are accumulated only for frames received OK. Five consecutively lost frames will cause the test to be aborted.

3-3-10 ONU Provision Wizard

Function description:

The section discribes ONU Provision Wizard. It first display ONU list in the OLT. You click ONU item and then ONU Queue Configuration will be displayed. You first select "Link number" option and then select Profile option. Profile option include "Each Llid 1Queue" , "Each Llid 2Queue" and "Load current config". Upstream and Downstream queue config is set correctly, you click NEXT. ONU Provision Setting will be displayed. You can roughly set Bridge Mode , SLA, Multi. SLA and click NEXT. Bridge Mode Setting will be displayed. In the page you can set precisely. If you set OK, you can click NEXT. Logical Link SLA will be displayed. If you go to final page, ONU Provision Setting including "Execute The Provision" , "Save Profile" and "Execute The Provision & Save Profile" will be displayed. Select which option and Click Finish, the procedure will be ended and the action will be done. If you don't want the setting, click ABANDON.



Parameter description:

Load Profile

Go to ONU Load Profile. Select file and Load file contents.

PREVIOUS

Go to previous setting.

NEXT

Go to next setting.

QUIT

Quit the ONU Provision.

ABANDON

Abandon the setting.

FINISH

Execute the option. Execute The Provision or Save Profile or Execute The Provision and Save Profile.

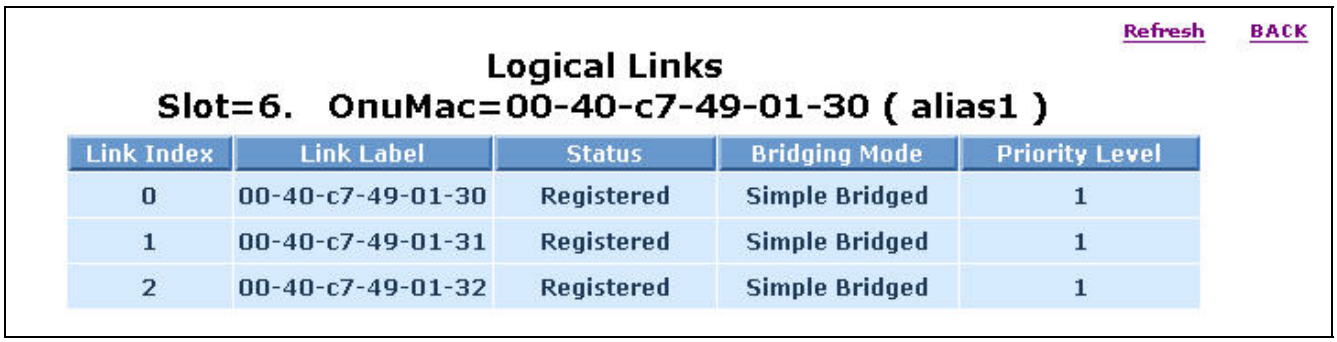
CENTRAL DE SERVIÇOS AO CLIENTE
0800 412100

3-4 Logical Link

3-4-1 Logical Link List

Function description:

The "Logical Link " table displays all provisioned logical links belonging to an ONU. Click on a row in this table, the corresponded management function submenu of the selected logical link will show up.


Refresh BACK

Logical Links

Slot=6. OnuMac=00-40-c7-49-01-30 (alias1)

Link Index	Link Label	Status	Bridging Mode	Priority Level
0	00-40-c7-49-01-30	Registered	Simple Bridged	1
1	00-40-c7-49-01-31	Registered	Simple Bridged	1
2	00-40-c7-49-01-32	Registered	Simple Bridged	1

Parameter description:

Link Index

Sequential numbering from 1 to N (N <= 8).

Link Label

The globally unique Mac Address assigned to a logical link. The Mac Address is used within an EPON system to identify the logical link.

In IEEE802.3ah specification,one ONU supports one logical link.But our ONU support multiple logical links(up to 8) in a single physical device.

Eight successive Mac Addresses are assigned for one ONU.

Status

Possible values are [Registered] or [Blocked].

Bridging Mode

The provisioned bridging mode of a logical link.

Priority Level

The priority level of the upstream SLA of a logical link.

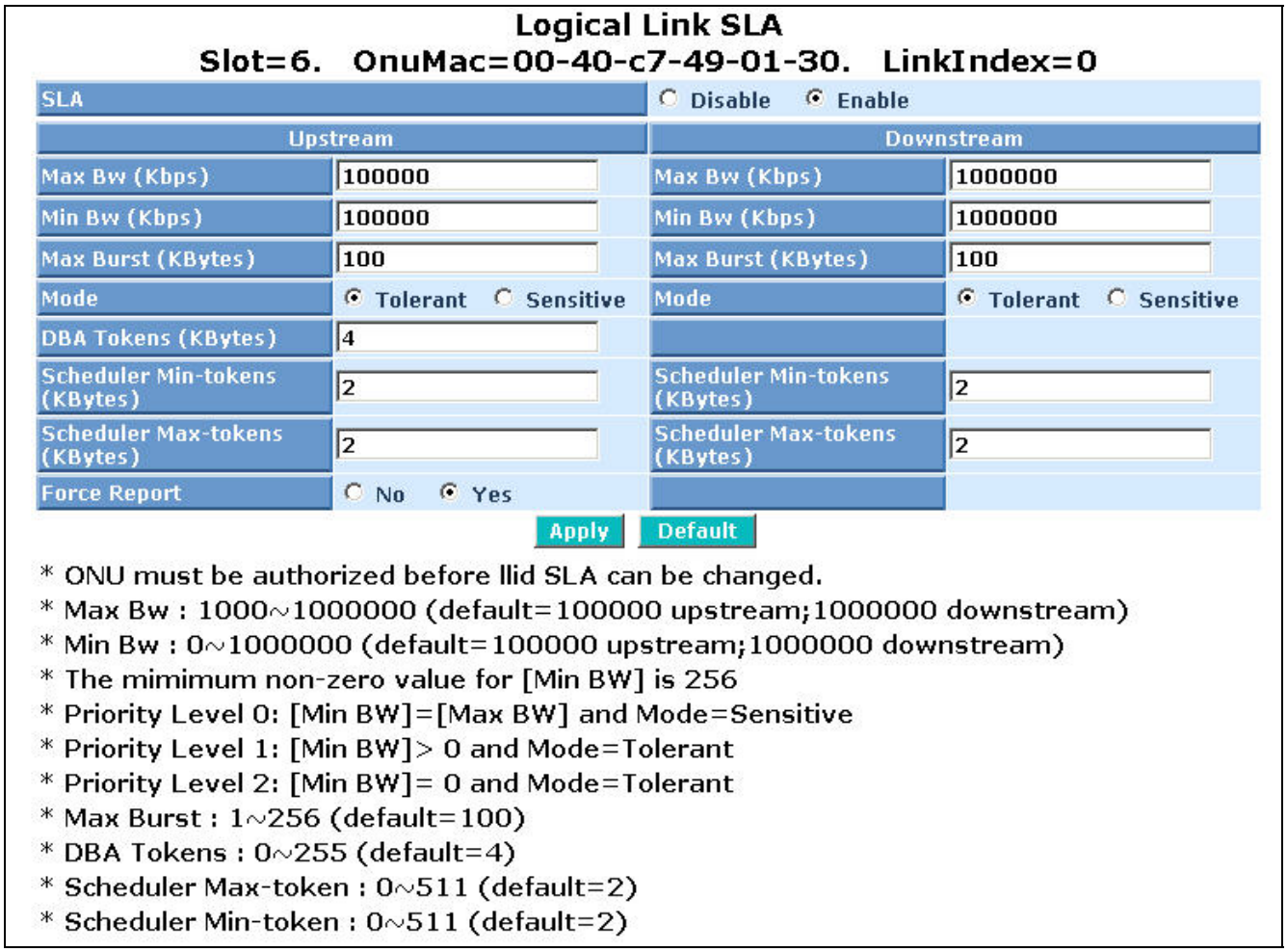
3-4-2 SLA (Service Level Agreement)

The Downstream traffic means the data from OLT to ONU Links. The Upstream traffic means the data from ONU Link to OLT. An SLA is disabled, the bandwidth of Logical Link will be not granted, and the multicast traffic will not be passed to the link. If the link is in any kind of Shared VLAN mode, the SLA (upstream and downstream) must be enabled.

About the bandwidth, the Maximum Allowed Bandwidth (Max Bw) must be more than Minimum Guaranteed Bandwidth (Min Bw), the difference must be 256Kbps or greater.

The Logical Link with one of the three priority levels for scheduling purposes. The three priorities are 0(high), 1(medium), 2(low). The priority is decided in SLA parameters, mode, Maximum Allowed Bandwidth, and Minimum Guaranteed Bandwidth, the configuration with the following SLA Parameters.

The detail about SLA is attached on Appendix A Chapter 5.



DBA Token, Scheduler Max Token, Scheduler Min Token, and Force Report provide a low-level control, which is used in queue schedulers. The link and queue schedulers use a weighted priority based round-robin discipline.

CENTRAL DE SERVIÇOS AO CLIENTE
0800 412100

They set upstream and downstream weights on a link. It is recommended that the parameters use the default settings as long as possible. If the Force Report is YES, it means each grant from OLT forces a report from ONU, Down stream has no such setting. The default value of the Force Report is YES. After the ONU is authorized, SLA enable/disable can be changed.

Parameter description:

Maximum Allowed Bandwidth (Max Bw)

The maximum allowed use Bandwidth, when the traffic is not crowded.

Range: 1000~1000000 (Unit: Kbps)

Default: 100000

Minimum Guaranteed Bandwidth (Min Bw)

This parameter will guarantee minimum bandwidth, when the data need to transmit, no matter what the traffic is crowded or not.

Range: 0~1000000 (Unit: Kbps)

Default: 100000

Max Burst

Range: 1~255 (Unit: KBytes)

Default: 100

DBA Token

Range: 0~255 (Unit: KBytes)

Default: 4

Scheduler Max token

Range: 0~511 (Unit: KBytes)

Default: 2

Scheduler Min Token

Range: 0~511 (Unit: KBytes)

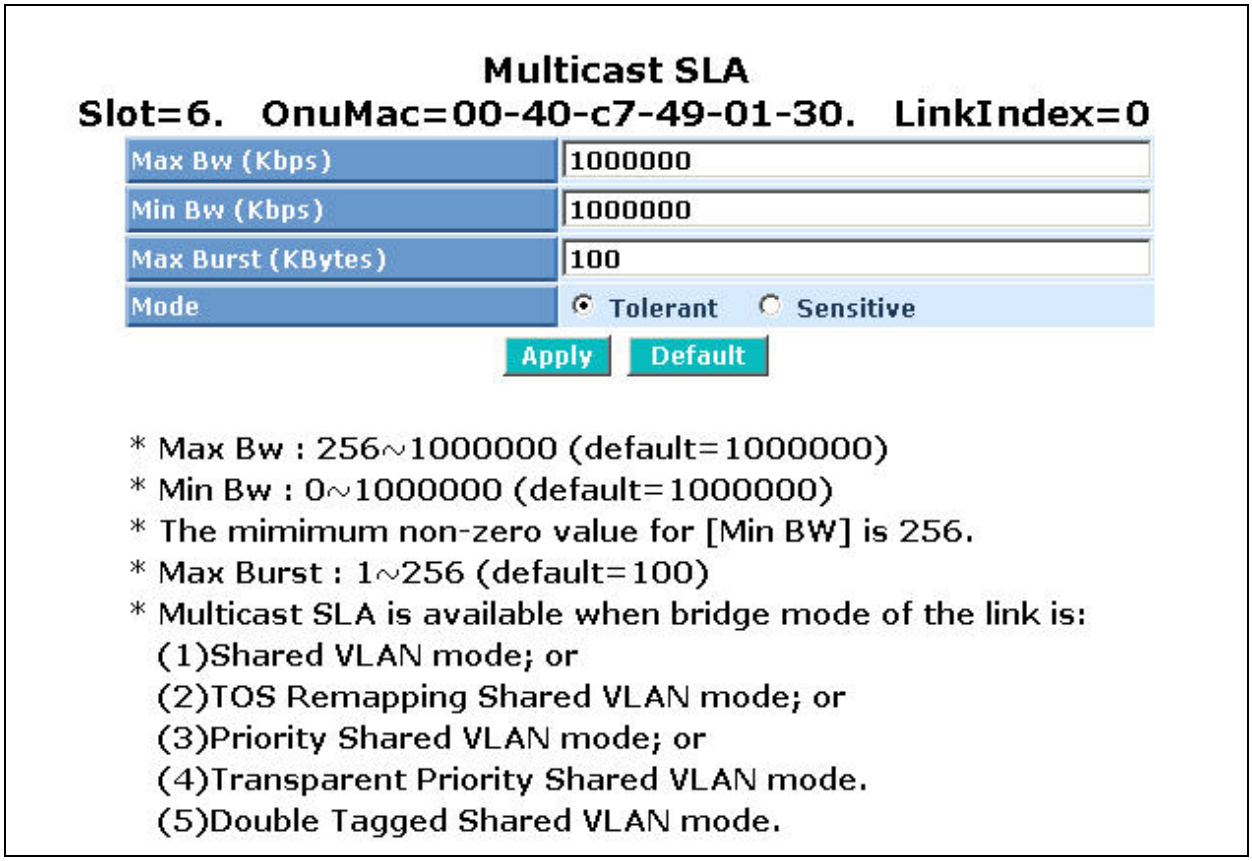
Default: 2

Force Report

It has two modes, YES and NO. "YES" is default value.

3-4-3 Multicast SLA

This command allows bandwidth control on multicast link for Shared VLAN. The aggregate shaper must be disabled, before setting the multicast SLA. If the aggregate shaper must be used, it must be enabled after setting multicast SLA. If Mode is sensitive, the Maximum Allowed Bandwidth must be equal to Minimum Guaranteed Bandwidth.



CENTRAL DE SERVIÇOS AO CLIENTE
0800 412100

Parameter description:

Maximum Allowed Bandwidth (Max Bw)

Range: 256~1000000 (Unit: Kbps)

Default: 1000000

Minimum Guaranteed Bandwidth (Min Bw)

Range: 0~1000000 (Unit: Kbps)

Default: 1000000

Max Burst

Range: 1~256 (Unit: KBytes)

Default: 100

Mode

It has two modes, Tolerant and Sensitive.

Note: The Multicast SLA can be enabled in Shared VLAN, Priority Remapping Shared VLAN, Priority Shared VLAN, and Trans. Pri. Shared VLAN, Double Tagged Shared VLAN mode.

3-4-4 Bridge Mode Setting

Function description:

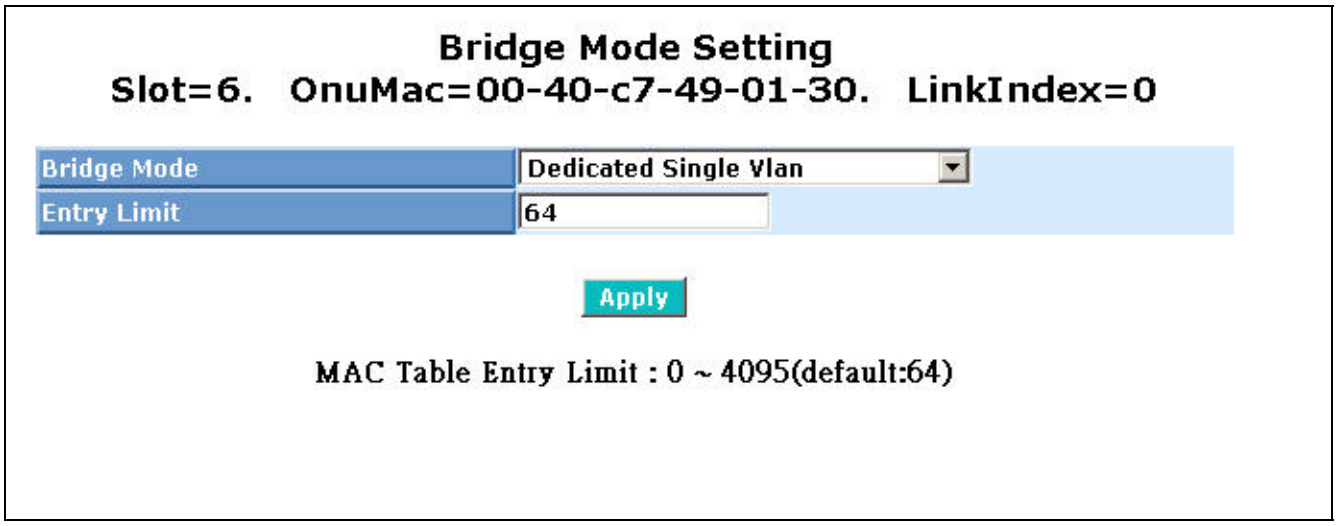
This command sets the per-Logical Link forwarding mode and learning table entry limit. Logical links may be configured for simple 802.1d bridging or for various flavors of VLAN bridging.

The OLT maintains a single MAC table that may contain up to 4095 dynamically learned MAC addressees used for downstream bridging and other features. For bridging modes that use the MAC table, the OLT learns the SA of upstream frame on a per LLID basis. An upper limit on the number of table entries that may be used is maintained for each LLID. When the sum of dynamically learned addresses reaches the per-LLID limit, additional MAC addresses will not be learned even if there is room in the table. The aggregate size of all per LLID MAC tables may exceed the available hardware table size (4095). In such a configuration, if the entire learning table is full, the oldest entry from all per LLID tables will be the target for replacement.

In the event that a per-LLID learning table becomes full, an attempt to learn another MAC address on that LLID will trigger a MAC Table Overflow alarm to be issued to the host processor. In such a case the oldest entry in that table is subject to replacement by the SA of a frame received upstream (that is frames received by the EPON port). Bridging modes that require a VLAN tag will not forward traffic until at least one VID has been set.

If a conflict exists between LLIDs configured in different bridging modes (DA matches simple bridged, but VLAN tag matches an LLID configured in a VLAN mode) the packet will be dropped.

The detail about Bridge Mode is attached on Appendix A Chapter 2.



CENTRAL DE SERVIÇOS AO CLIENTE
0800 412100

Parameter description:

Bridge Mode

Decide data flow by way of setting various Bridging Type.

Bridging Type include 15 types.

0 = Simple Bridged,

1 = Dedicated Single VLAN,

2 = Dedicated Double VLAN,

3 = Shared VLAN,

4 = Transparent VLAN,

7 = Prioritized VLAN,

8 = Priority Remapping Single VLAN,

9 = Priority Remapping Double VLAN,

10 = Priority Remapping Shared VLAN,

11 = Priority Shared VLAN,

13 = Transparent Priority Shared VLAN

14 = Transparent Shared VLAN with Broadcast

15 = Double Tagged Shared VLAN

Entry Limit

An upper limit on the number of table entries that may be used is maintained for each LLID.

Range: 0~4095

Default: 64

3-4-4-1 Vlan Tag Setting

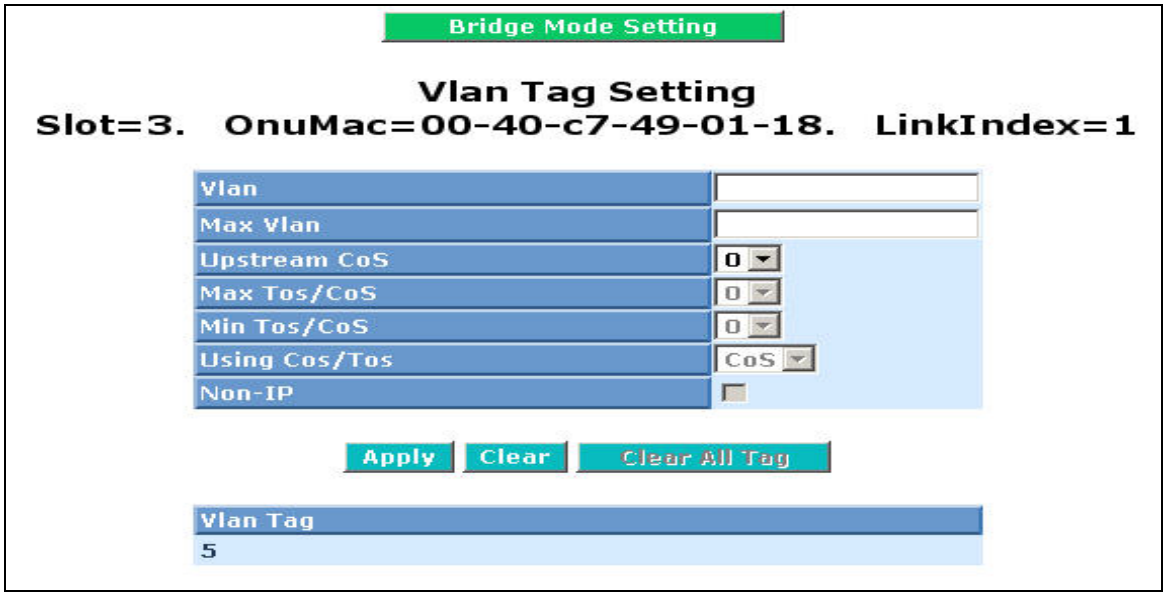
Function description:

This function associates a VLAN tag with a logical link when the link is configured for one of the VLAN bridging types. It is possible for some bridging modes to associate a VLAN tag with multiple logical links by repeating this command with different logical links. For example, a Shared VLAN could be created bridging a number of logical links. Conversely, a logical link may be assigned multiple VLAN tags. For example, the Transparent VLAN mode allows multiple VLAN tags per logical link.

When provisioning tags, two fields are included in the message: VLAN Tag, and Translated VLAN ID. However, the field labeled "Translated VLAN ID" is only meaningful when the corresponding LLID is configured to use Translated VLAN Mode(FK-C16 not supported Translated Vlan Mode). For all other modes there is no Translated VLAN Mode.

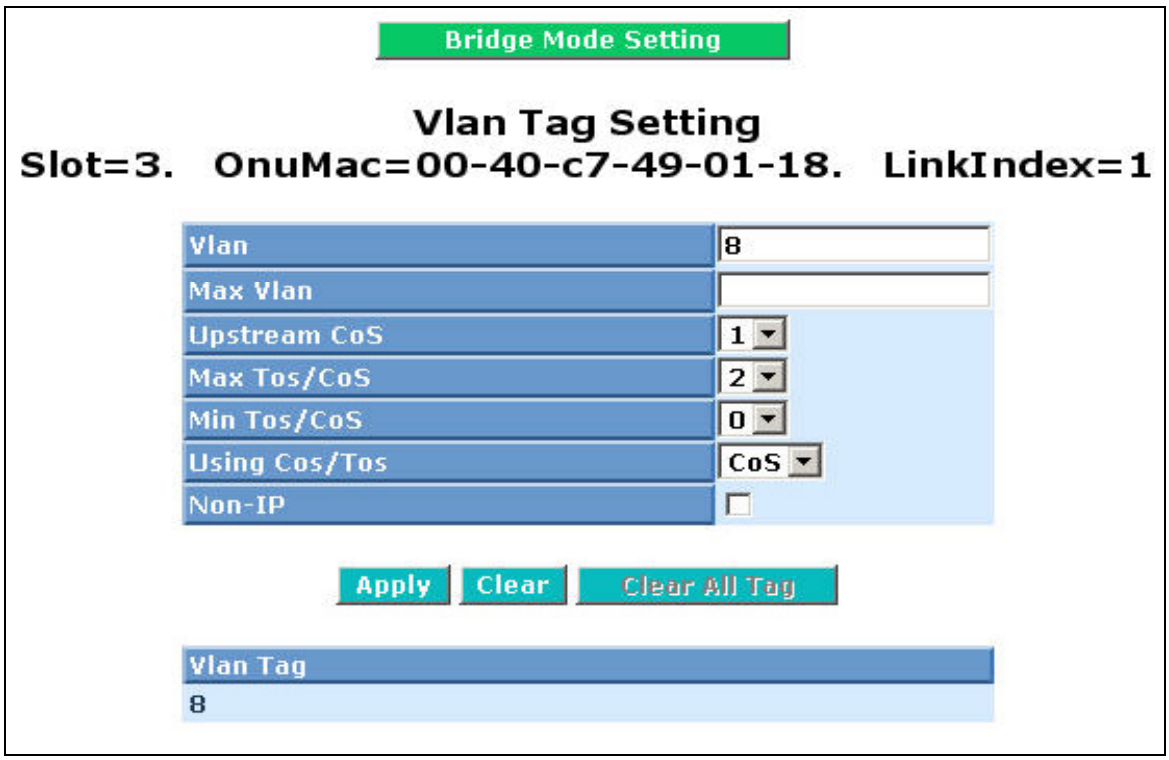
COS: The VLAN Id field is 16 bits out of which the Most significant 3 bits denote the COS value.
If Bridge mode is Simple Bridge, can't set vlan tag. If Bridge mode is Dedicated Single VLAN, Dedicated Double VLAN, Shared VLAN, Transparent VLAN, Priority Remapping Single VLAN, Priority Remapping Double VLAN, Priority Remapping Shared VLAN, Transparent Shared VLAN with Broadcast, you only set Vlan and Upstream Cos.

If Bridge mode is Prioritized VLAN, Priority Shared VLAN, Transparent Priority Shared VLAN, you set Vlan, Upstream Cos, Max Cos, Min Cos and Using Cos.



The above picture shows to set vlan tag in shared vlan mode.

CENTRAL DE SERVIÇOS AO CLIENTE
0800 412100



The above picture shows to set vlan tag in prioritized vlan mode.

3-4-5 EPON Security

This command is used in encryption keys. This parameter is a timeout value. When timer expires, a new key will be generated and exchanged. That setting 0 means disable security. The detail about encryption key is attached on Appendix A Chapter 3.

Key Exchange Timer

Range: 0~65535 (Unit: sec)

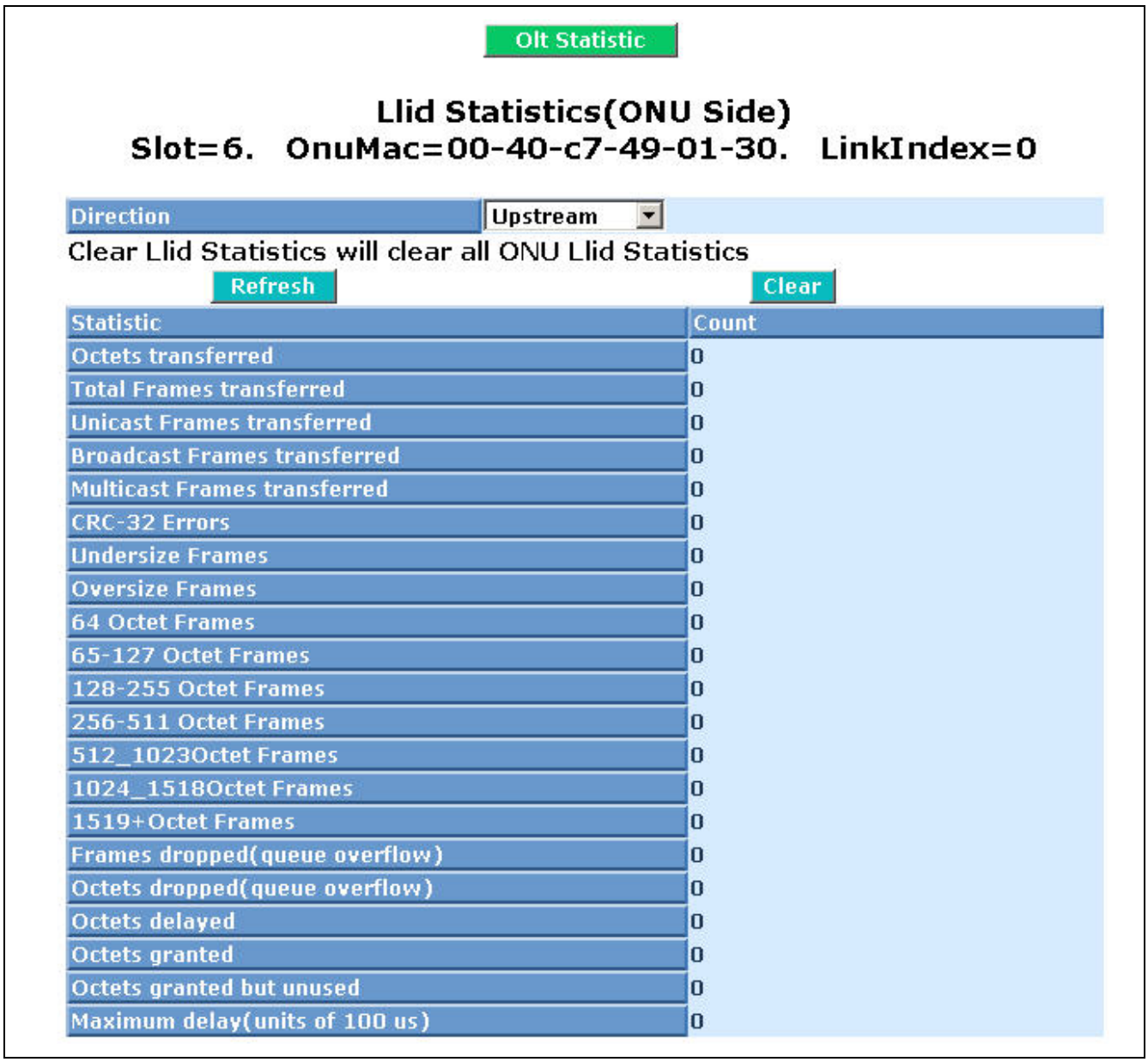
Default: 0 (Disable: 0)

CENTRAL DE SERVIÇOS AO CLIENTE
0800 412100

3-4-6 Link Statistics

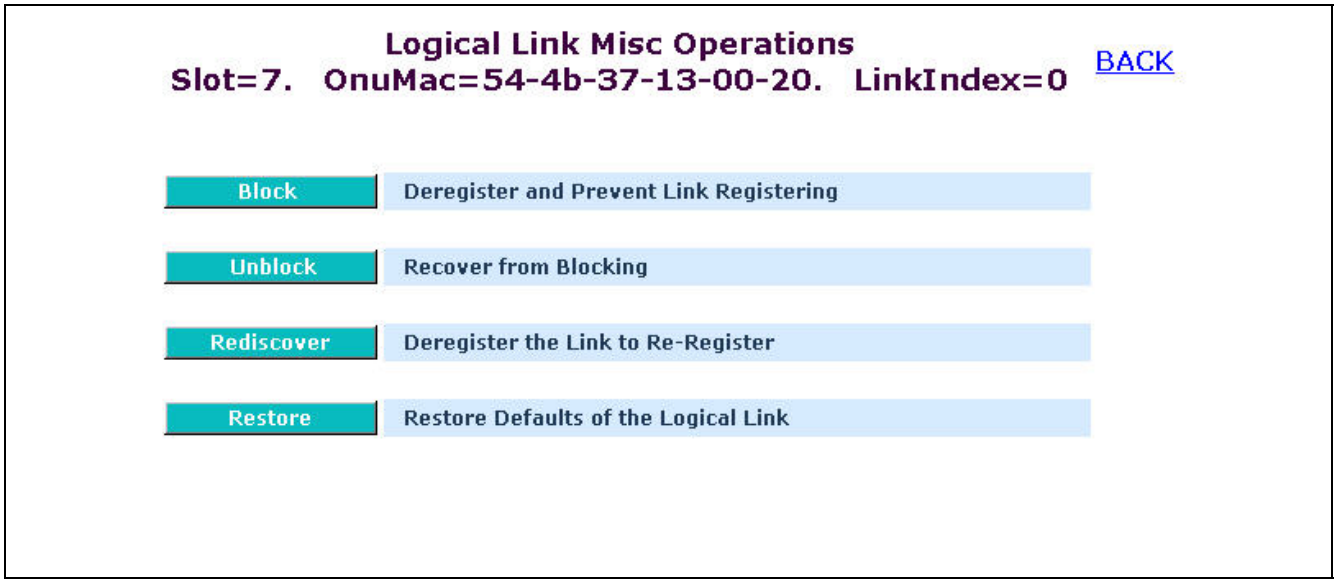
Function description:

Request statistics is related to the individual Logical Link specified. It includes OLT side and ONU side. The directions include upstream and downstream. If you click Refresh button, the statistics information will be displayed. If you click Clear button, the statistics information will be cleared. Upstream direction reflects the traffic from Epon port to CNI port. Downstream direction reflects the traffic from CNI port to Epon port.



3-4-7 Link Operation

Function description:



Parameter description:

Block

Deregisters a logical link and prevent it from registering to its OLT.

Unblock

Makes a logical link being participable in OLT's normal discovery process.

Rediscover

Deregisters a logical link to force an ONU to re-register this logical link.

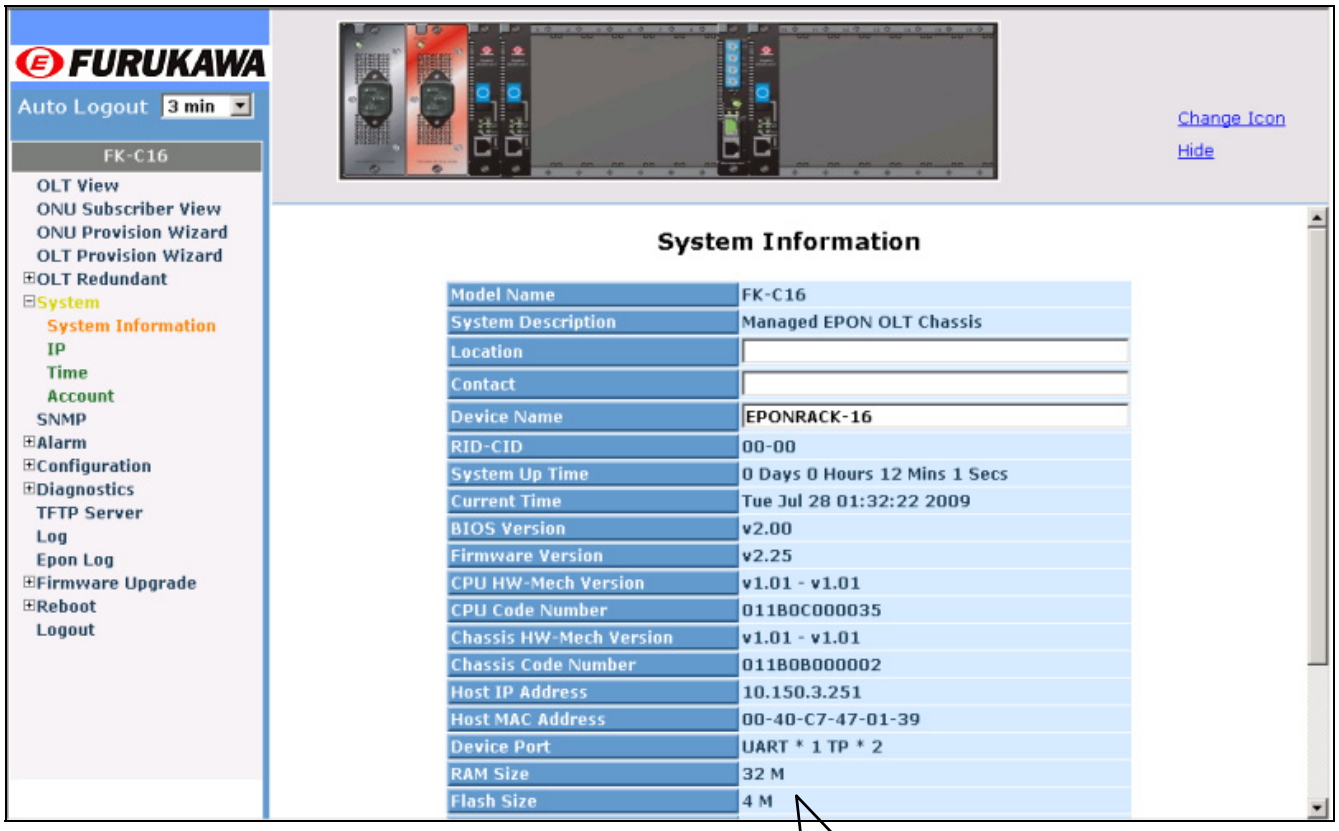
Restore

Erases only provisioning records about a logical link kept in the NVS of an OLT.This operation returns the operator provisioning records which are related with a logical link to default values.

CENTRAL DE SERVIÇOS AO CLIENTE
0800 412100

3-5 System

3-5-1 System Information



Display the basic information of FK-C16

Parameter description:

Model Name

The model name of this device.

System Description

As it is, this tells what this device is. Here, it is "Managed Chassis".

Location

Basically, it is the location where this converter chassis is put. User-defined.

Contact

For easily managing and maintaining device, you may write down the contact person and phone here for getting help soon. You can configure this parameter through the device's user interface or SNMP.

Device Name

The name of the converter chassis. User-defined. Default is FK-C16.

CID-RID (Rack ID – Chassis ID)

Rack ID(RID) indicates which rack the machine is located.

Chassis ID(CID) indicates which chassis of a rack the machine is located.

System Up Time

The time accumulated since this converter chassis is powered up. Its format is day, hour, minute, second.

Current Time

Show the system time of FK-C16. Its format: day of week, month, day, hours : minutes : seconds, year. For instance, Wed, Feb. 23, 12:10:10, 2005.

BIOS Version

The version of the BIOS of this converter chassis.

Firmware Version

The firmware version of this converter chassis.

CPU HW-Mech Version

The version of CPU Hardware and Mechanical. The figure before the hyphen is the version of electronic hardware; after the hyphen is the version of mechanical.

CENTRAL DE SERVIÇOS AO CLIENTE
0800 412100

CPU Code Number

The serial number is assigned by the manufacturer.

Chassis HW-Mech Version

The version of Chassis Hardware and Mechanical. The figure before the hyphen is the version of electronic hardware; after the hyphen is the version of mechanical.

Chassis Code Number

The Code Number is a manufacturer code assigned by the manufacturer.

Host IP Address

It is the Ethernet MAC address of the agent management interface in this converter chassis.

Host MAC Address

The IP address is that indicates where FK-C16's management interface is located (e.g. default IP address of FK-C16 is 192.168.1.1). The management interface is physical linked on CPU board's Ethernet port 1 and port 2.

Device Port

Show all types and numbers of the port in FK-C16.

RAM Size

The size of the DRAM in this converter chassis.

Flash Size

The size of the flash memory in this converter chassis.

System Temperature

The air temperature inside of this converter chassis.

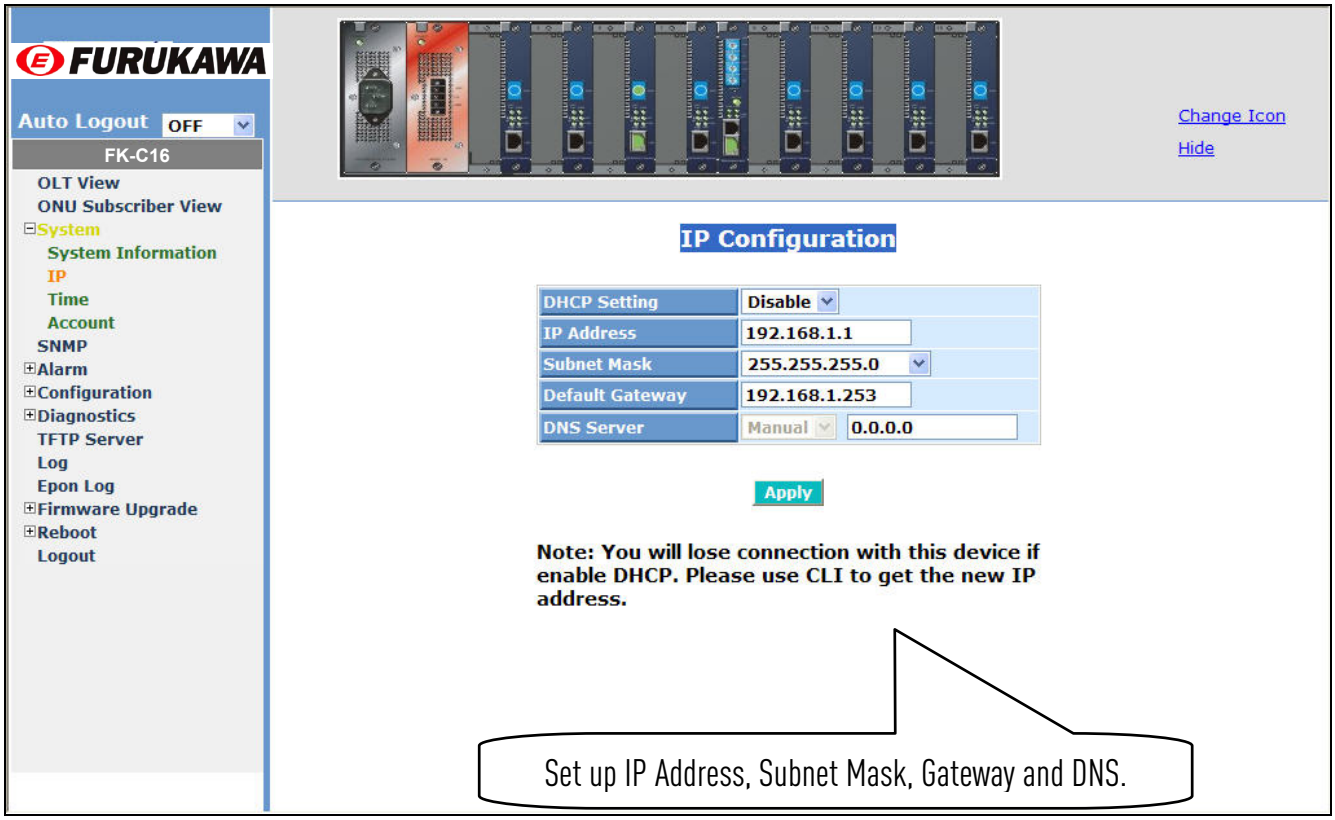
Fan

Display the RPM of the fans for cooling.

Voltage

Show the figure of the DC voltage from power source in this converter chassis.

3-5-2 IP Configuration



Parameter description:

DHCP Setting

DHCP is the abbreviation of Dynamic Host Configuration Protocol. Here DHCP means a switch to turn ON or OFF the function.

The converter chassis supports DHCP client used to get an IP address automatically if you set this function "Enable". When enabled, the converter chassis will issue the request to the DHCP server resided in the network to get an IP address. If DHCP server is down or does not exist, the converter chassis will issue the request and show IP address is under requesting, until the DHCP server is up. Before getting an IP address from DHCP server, the device will not continue booting procedures. If set this field "Disable", you'll have to input IP address manually.

Default: Disable

CENTRAL DE SERVIÇOS AO CLIENTE
0800 412100

IP Address

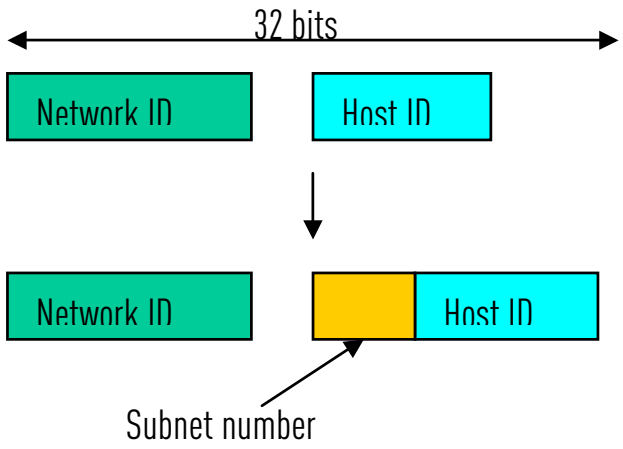
Users can configure the IP settings and fill in new values if users set the DHCP function "Disable". Then, click <Apply> button to update.

When DHCP is disabled, Default: 192.168.1.1

If DHCP is enabled, this field is filled by DHCP server and will not allow user manually set it any more.

Subnet Mask

Subnet mask is made for the purpose to get more network address because any IP device in a network must own its IP address, composed of Network address and Host address, otherwise can't communicate with other devices each other. But unfortunately, the network classes A, B, and C are all too large to fit for almost all networks, hence, subnet mask is introduced to solve this problem. Subnet mask uses some bits from host address and makes an IP address looked Network address, Subnet mask number and host address. It is shown in the following figure. This reduces the total IP number of a network able to support, by the amount of 2 power of the bit number of subnet number (2^(bit number of subnet number)).



Subnet mask is used to set the subnet mask value, which should be the same value as that of the other devices resided in the same network it attaches.

Default: 255.255.255.0

Default Gateway

Set an IP address for a gateway to handle those packets that do not meet the routing rules predefined in the device. If a packet does not meet the criteria for other pre-defined path, it must be forwarded to a default router on a default path. This means any packet with undefined IP address in the routing table will be sent to this device unconditionally.

Default: 192.168.1.254

DNS

It is Domain Name Server used to serve the translation between IP address and name address.

The converter chassis supports DNS client function to re-route the mnemonic name address to DNS server to get its associated IP address for accessing Internet. User can specify a DNS IP address for the converter chassis. With this, the converter chassis can translate a mnemonic name address into an IP address.

There are two ways to specify the IP address of DNS. One is fixed mode, which manually specifies its IP address, the other is dynamic mode, which is assigned by DHCP server while DHCP is enabled. DNS can help you easily remember the mnemonic address name with the meaningful words in it. Default is no assignment of DNS address.

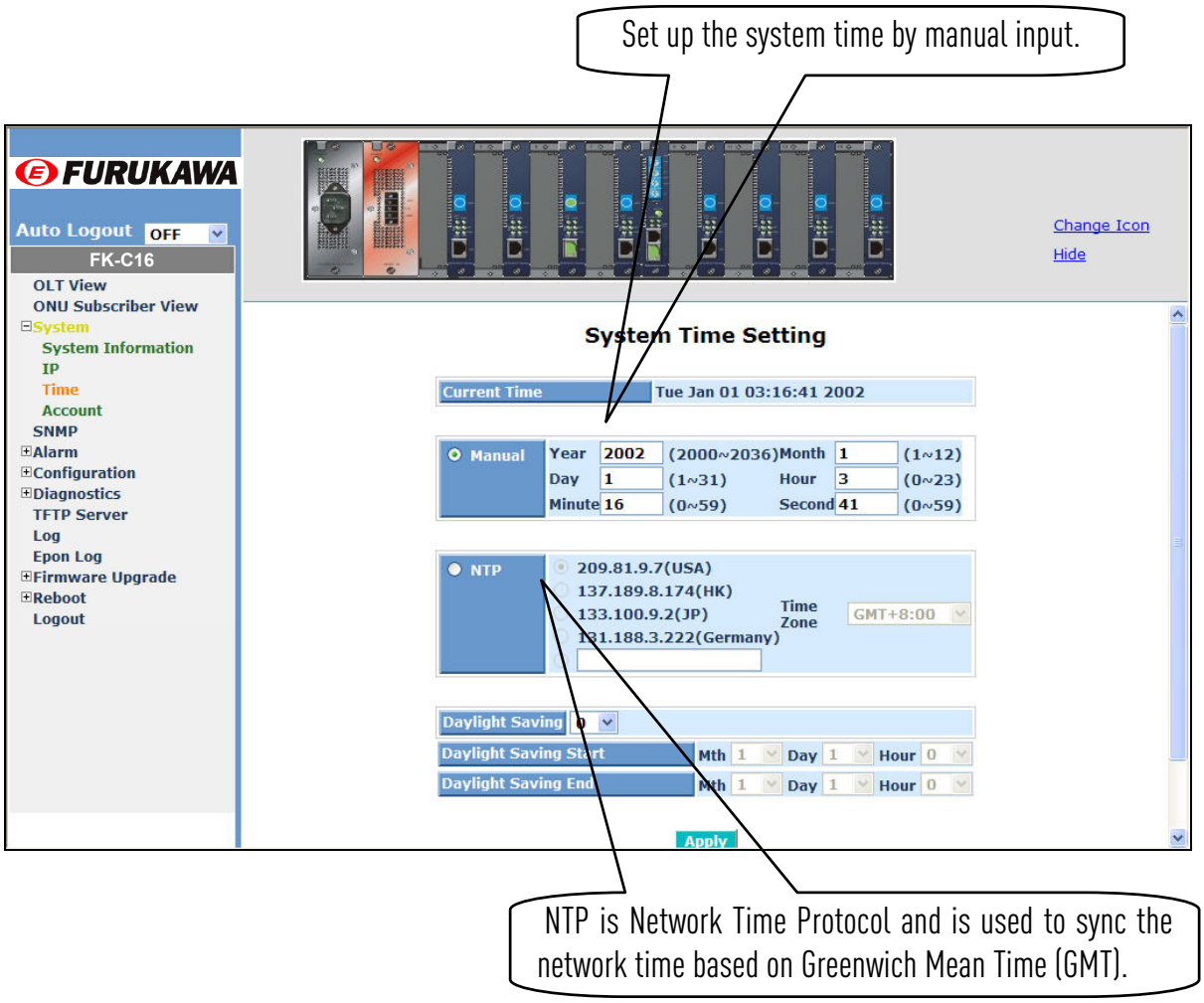
Default: 0.0.0.0

Current IP:

Display the IP address that is used by the device currently.

CENTRAL DE SERVIÇOS AO CLIENTE
0800 412100

3-5-3 System Time Configuration



Note: The function also supports daylight saving for different area's time adjustment.

Parameter description:

Manual

This is the function to adjust the time manually. Filling the valid figures in the fields of Year, Month, Day, Hour, Minute and Second respectively and press <Apply> button, time is adjusted. The valid figures for the parameter Year, Month, Day, Hour, Minute and Second are >=2000, 1-12, 1-31, 0-23, 0-59 and 0-59 respectively. Input the wrong figure and press <Apply> button, the device will reject the time adjustment request. There is no time zone setting in Manual mode.

Default: Year = 2000, Month = 1, Day = 1

Hour = 0, Minute = 0, Second = 0

NTP

NTP is Network Time Protocol and is used to sync the network time based Greenwich Mean Time (GMT). If use the NTP mode and select a built-in NTP time server or manually specify an user-defined NTP server as well as Time Zone, the converter chassis will sync the time in a short after pressing <Apply> button. Though it synchronizes the time automatically, NTP does not update the time periodically without user's processing.

Time Zone is an offset time off GMT. You have to select the time zone first and then perform time sync via NTP because the converter chassis will combine this time zone offset and updated NTP time to come out the local time, otherwise, you will not able to get the correct time. The converter chassis supports configurable time zone from –12 to +13 step 1 hour.

Default Time zone: +8 Hrs.

Daylight Saving

Daylight saving is adopted in some countries. If set, it will adjust the time lag or in advance in unit of hours, according to the starting date and the ending date. For example, if you set the day light saving to be 1 hour. When the time passes over the starting time, the system time will be increased one hour after one minute at the time since it passed over. And when the time passes over the ending time, the system time will be decreased one hour after one minute at the time since it passed over.

The converter chassis supports valid configurable day light saving time is –5 ~ +5 step one hour. The zero for this parameter means it need not have to adjust current time, equivalent to in-act daylight saving. You don't have to set the starting/ending date as well. If you set daylight saving to be non-zero, you have to set the starting/ending date as well; otherwise, the daylight saving function will not be activated.

Default for Daylight Saving: 0.

CENTRAL DE SERVIÇOS AO CLIENTE
0800 412100

Day Light Saving Start

This is used to set when to start performing the day light saving time.

Mth:

Range is 1 ~ 12.

Default: 1

Day:

Range is 1 ~ 31.

Default: 1

Hour:

Range is 0 ~ 23.

Default: 0

Day Light Saving End

This is used to set when to stop performing the daylight saving time.

Mth:

Range is 1 ~ 12.

Default: 1

Day:

Range is 1 ~ 31.

Default: 1

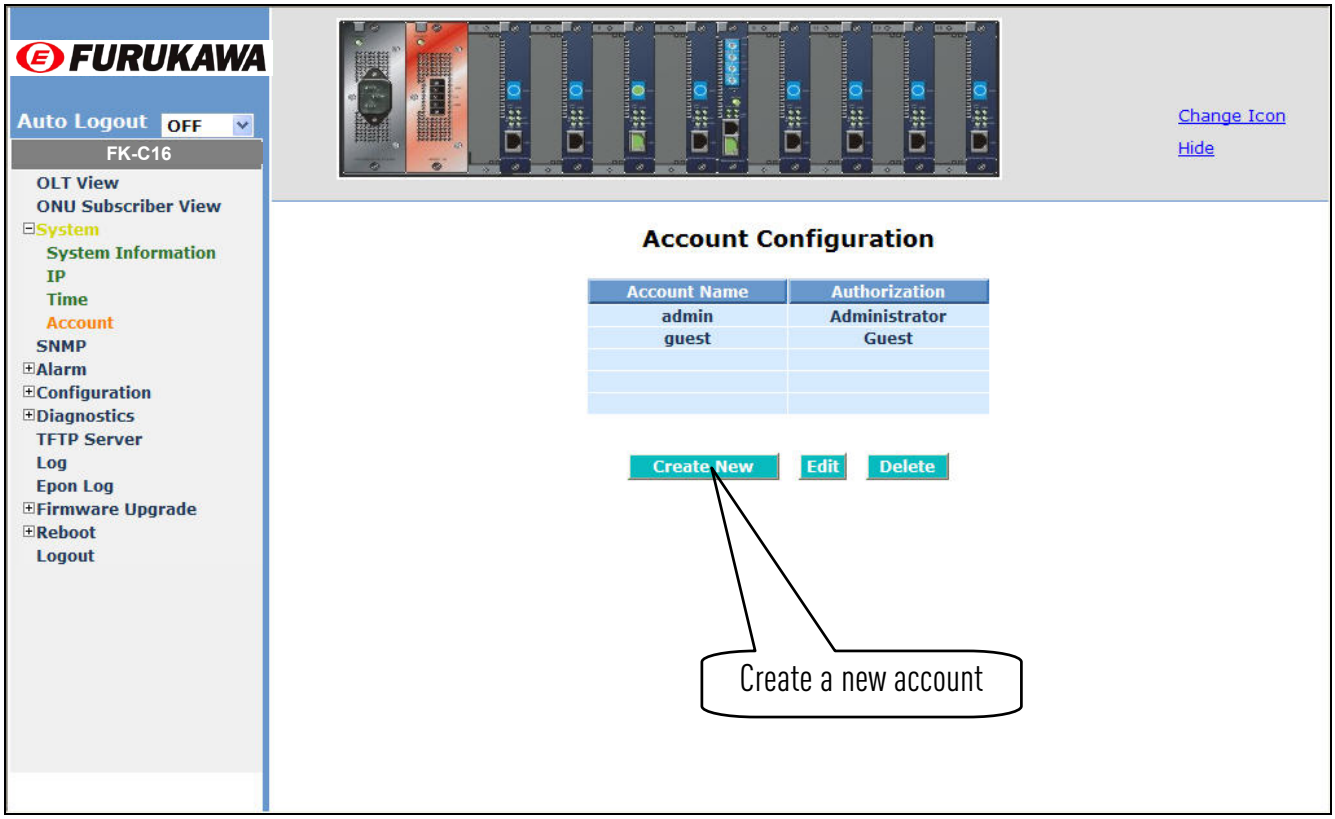
Hour:

Range is 0 ~ 23.

Default: 0

3-5-4 Account Configuration

In this function, only the administrator can create, modify or delete the username and password. The administrator can modify other guest identities' and administrator-equivalent identities' passwords. A user with Guest-equivalent identity cannot modify his password.

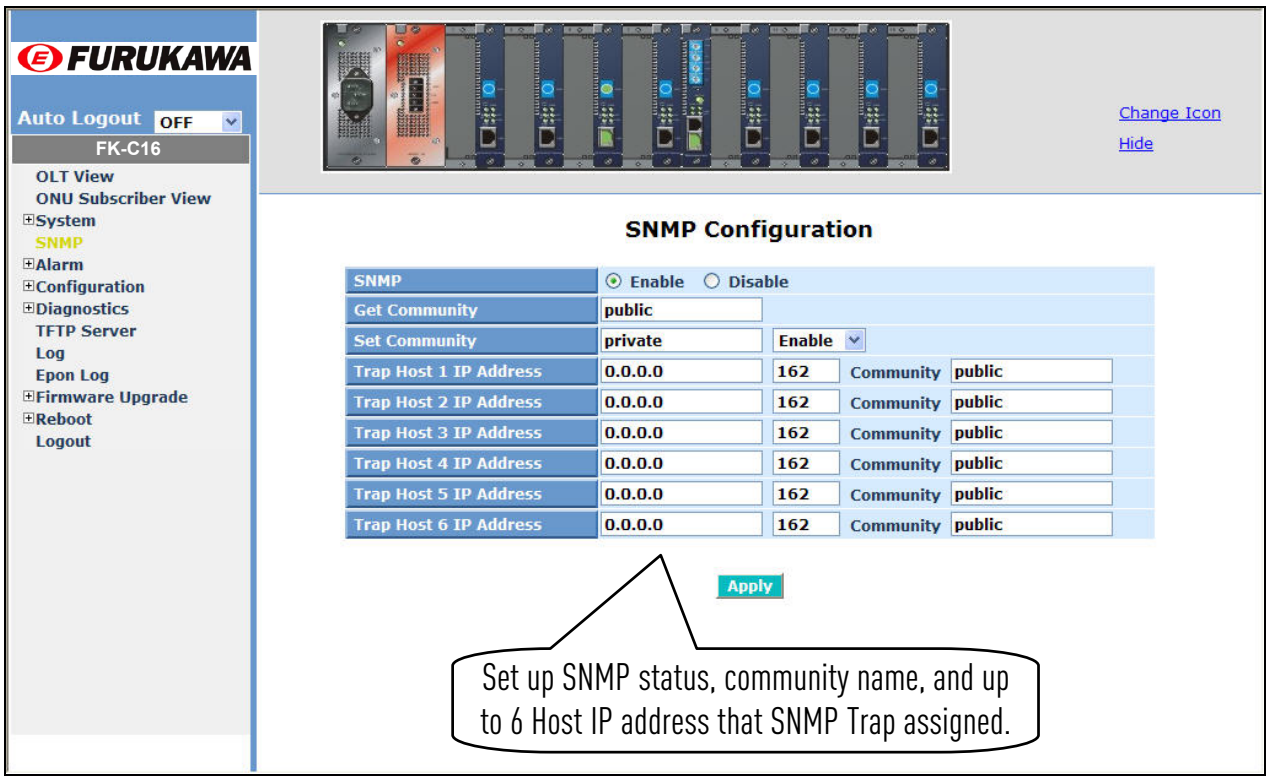


Note:

- Please confirm the user's Manager/Guest identity on the list of Identity in advance before configuring the username and password.
- Account number is added to 30. Only admin login can create/modify/delete user, and other administrator can see only . The differences admin and other administrator are 1.create/delete user , 2.Clear Log/Epon Log.

CENTRAL DE SERVIÇOS AO CLIENTE
0800 412100

3-6 SNMP Configuration



Parameter description:

SNMP

The term SNMP here is used for the activation or de-activation of SNMP. Default is Enable.

Get/Set/Trap Community

Community name is used as password for authenticating if the requesting network management unit belongs to the same community group. If they both don't have the same community name, they don't belong to the same group. Hence, the requesting network management unit can not access the device with different community name via SNMP protocol; if they both have the same community name, they can talk each other.

Community name is user-definable with a maximum length of 15 characters and is case sensitive. There is not allowed to put any blank in the community name string. Any printable character is allowable.

The community name for each function works independently. Each function has its own community name. Say, the community name for GET only works for GET function and can't be applied to other function such as SET and Trap.

Default community name for GET: public

Default community name for SET: private

Default Set function: Enable

Default community name for Trap: public

Default trap host IP address: 0.0.0.0

Default trap port: 162

Trap Host

In the converter chassis, there are 6 trap hosts supported. Each of them has its own community name and IP address; is user-definable. To set up a trap host means to create a trap manager by assigning an IP address to host the trap message. In other words, the trap host is a network management unit with SNMP manager receiving the trap message from the managed converter chassis with SNMP agent issuing the trap message. 6 trap hosts can prevent the important trap message from losing.

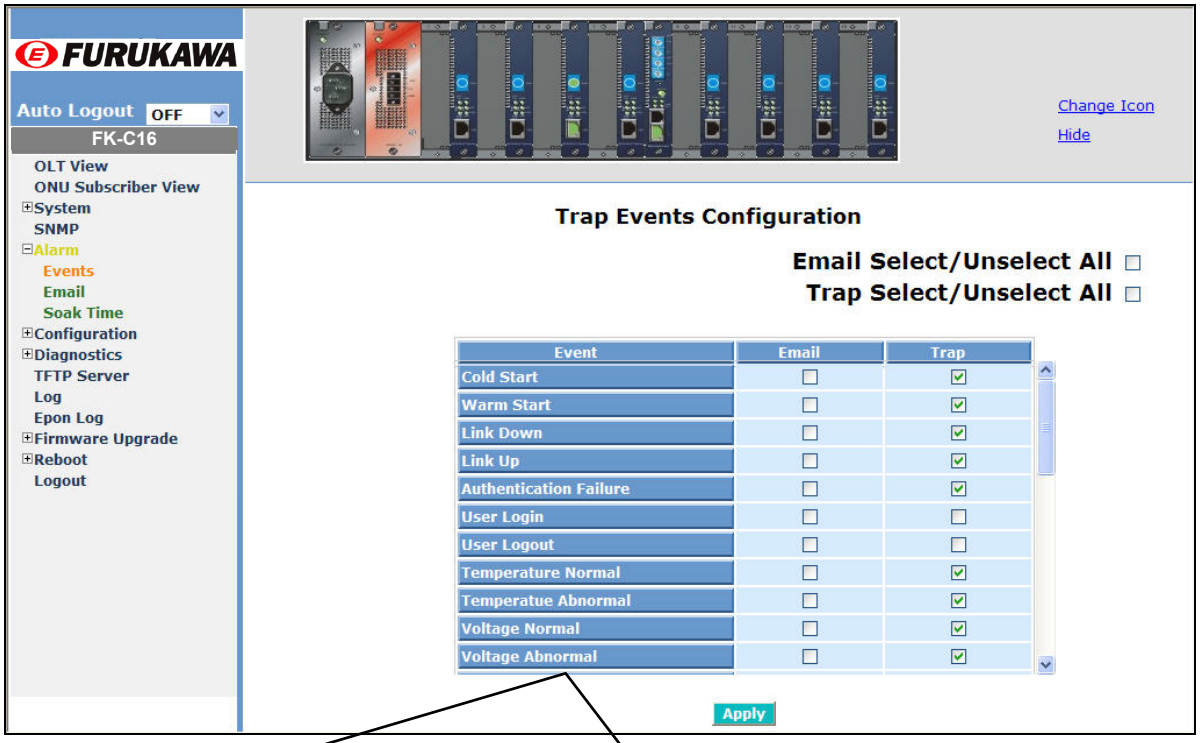
For each public trap, the converter chassis supports the trap event Cold Start, Warm Start, Link Down, Link Up and Authentication Failure Trap. They can be enabled or disabled individually. When enabled, the corresponded trap will actively send a trap message to the trap host when a trap happens. If all public traps are disabled, no public trap message will be sent. As to the Enterprise (no. 6) trap is classified as private trap, which are listed in the Trap Alarm Configuration function folder.

Default for all public traps: Enable.

CENTRAL DE SERVIÇOS AO CLIENTE
0800 412100

3-7 Alarm

3-7-1 Events Configuration



The trap events that had been checked will be sent out in three ways, including e-mail, SMS and Trap.

Parameter description:

Trap

Cold Start

Warm Start

Link Down

Link Up

Authentication Failure

Login

User Login

User Logout

VDC

VDC Normal

VDC Over/Under

FAN

FAN Normal

FAN Abnormal

Power

Power Inserted

Power Abnormal

Power Removed

Temperature

Temperature Normal

Temperature Abnormal

Module

Module Egress Rated BW changed

Module Ingress Rated BW changed,

Module Inserted

Module Removed

Remote

Remote Fiber Link up

Remote Fiber Link down

Remote TP Link Up

Remote TP Link down

CENTRAL DE SERVIÇOS AO CLIENTE
0800 412100

Event	Come from
Cold Start	Host
Warm Start	Host
Authentication Failure	Host
User Login	Host
User Logout	Host
Temperature Normal	Host
Temperatue Abnormal	Host
Voltage Normal	Host
Voltage Abnormal	Host
Fan RPM Normal	Host
Fan RPM Abnormal	Host
Power Inserted	Host
Power Removed	Host
Power Normal	Host
Power Abnormal	Host
OLT Insert	OLT
OLT Remove	OLT
CNI Link Down	OLT
CNI Link Up	OLT
Standard Link Fault	OLT/ONU
Epon Link Up	OLT/ONU
Epon Link Down	OLT/ONU
Queue Overflow	OLT/ONU
MAC Learing Table Overflow	OLT/ONU
Key Exchange Failure	OLT/ONU
Number Of Links Exceeded	OLT
Jumbo Frame Error	OLT
EPON No Links Discovery	OLT
OLT Bad	OLT
UNI Link Up	ONU
UNI Link Down	ONU
Loopback	ONU
Standard Dying Gasp	ONU
Dying Gasp Power Failure	ONU
ONU Power Abnormal	ONU

Parameter description:

Standard Link Fault

ONU reports a Link Fault via the flag in the 802.3ah OAM header. No further information about the fault is available. Detected when Link fault flag in OAM frame is set. Cleared when Link fault flag in OAM frame in no longer set.

Queue Overflow

One of the queues for the link has dropped frames due to becoming full. Detected when OLT/ONU upstream,downstream queue full. Cleared when queue becomes not full.

Mac Learning Table Overflow

MAC address learning table is full, not in overwrite mode, and a new MAC address was encountered.

Key Exchange Fallure

The link peer has failed to generate a new key message, or to switch to the new key, in the time allotted by the key exchange timer for this link. Encryption remains in force using the old key, and the key exchange process continues. The alarm will clear when a new key is established.

Number of Link Exceeded

Attempt to register more logical links than supported by the OLT flash setting.

Loopback

The link is currently in the loopback state. Detected when link is set to loopback mode. Cleared when loopback is cleared.

Standard Dying Gasp

ONU reports Dying Gasp via that bit in 802.3ah OAM header. Detected When DG bit is set . Cleared when DG bit is no longer set .

Dying Gasp Power Failure

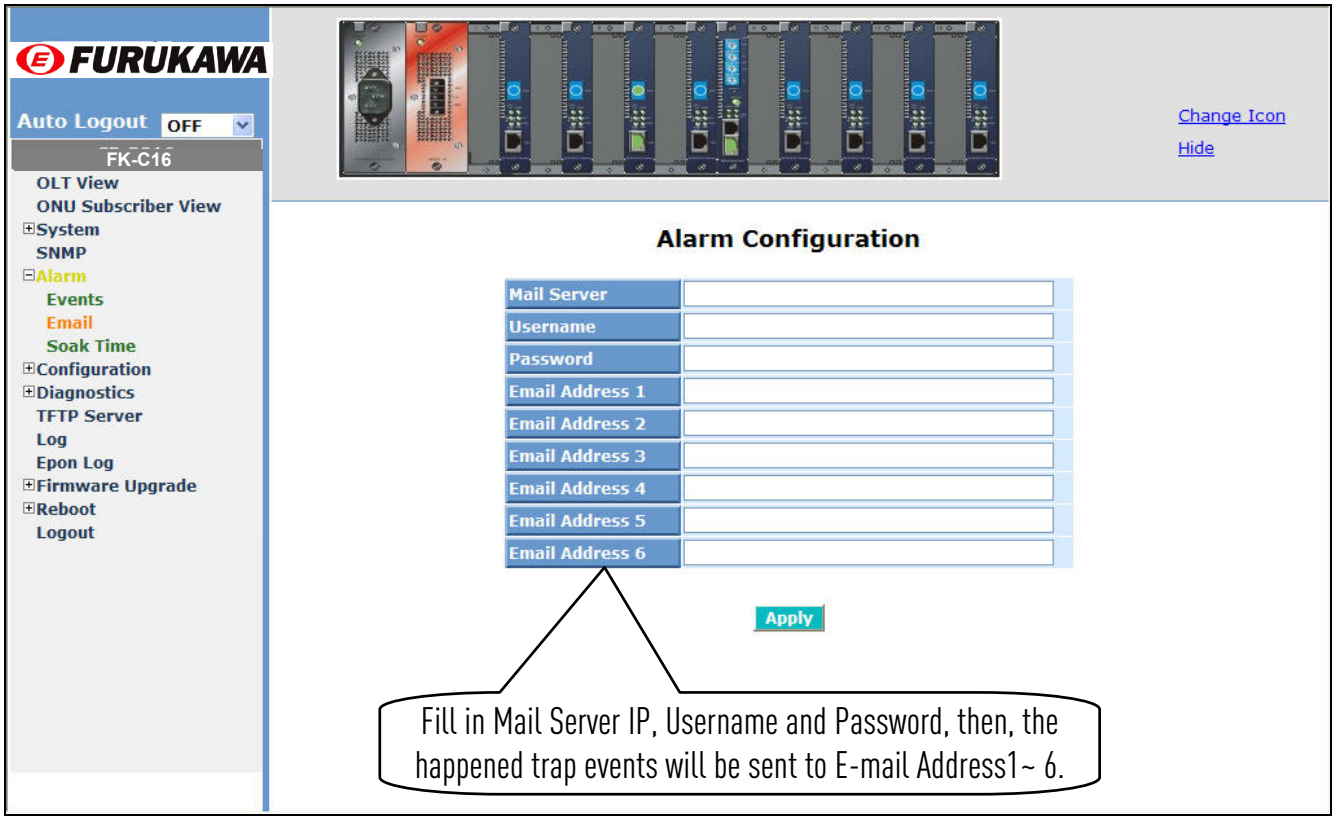
Detected when ONU Voltage from 5V to 0V.

ONU Power Abnormal

Detected when ONU Voltage from 5V to 4V.

CENTRAL DE SERVIÇOS AO CLIENTE
0800 412100

3-7-2 Email Configuration



Parameter description:

Mail Server

The IP address of the server transferring your email.

Username

Your username on the mail server.

Password

Your password on the mail server.

Email Address 1 – 6

E-mail address that would like to receive the alarm message.

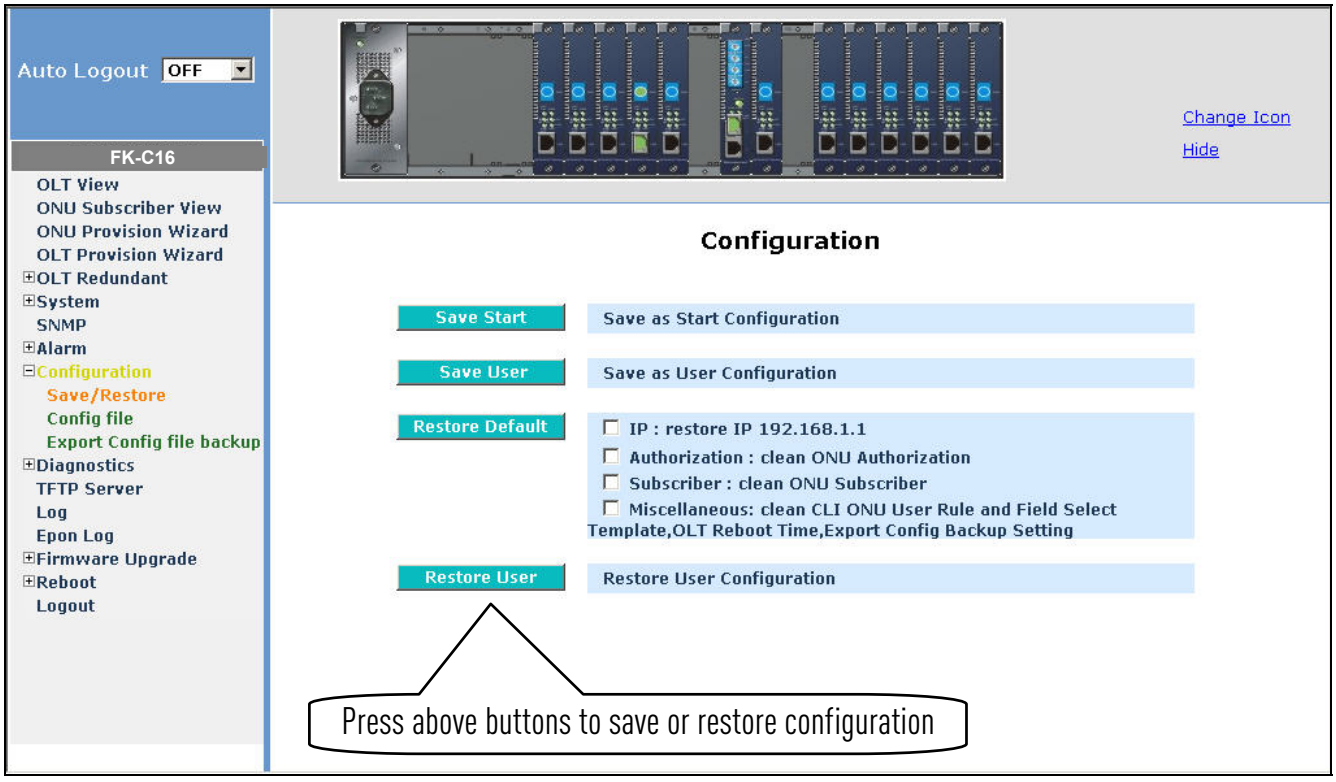
3-8 Soak Time Configuration

This item sets the Soak times to set and clear an alarm. A condition becomes an alarm only if the condition remains in effect for a period longer than the Soak time. Similarly, an alarm would be cleared if the clear condition is longer than the setting in Soak Time Before Clear. The Loop back and the Statistics alarms are not soaked.

CENTRAL DE SERVIÇOS AO CLIENTE
0800 412100

3-9 Configuration

3-9-1 Save/Restore



Parameter description:

Save Start

Press <Save Start> button to save the working configuration into the flash. Then, this configuration will be the one after rebooting the system.

Save User

Press <Save User> button to save current configuration as a user configuration file in flash memory. You can use <Restore User> button function to restore the backup user configuration.

Restore Default

Press <Restore Default > button to restore factory default setting included default IP address, Authorization, ONU Subscriber, Others(Epon User Rules, OLT Reboot Time, Config Backup Time).

IP checked represents IP is set 192.168.1.1.

Authorization checked represents clean Authorization parts of Flash.

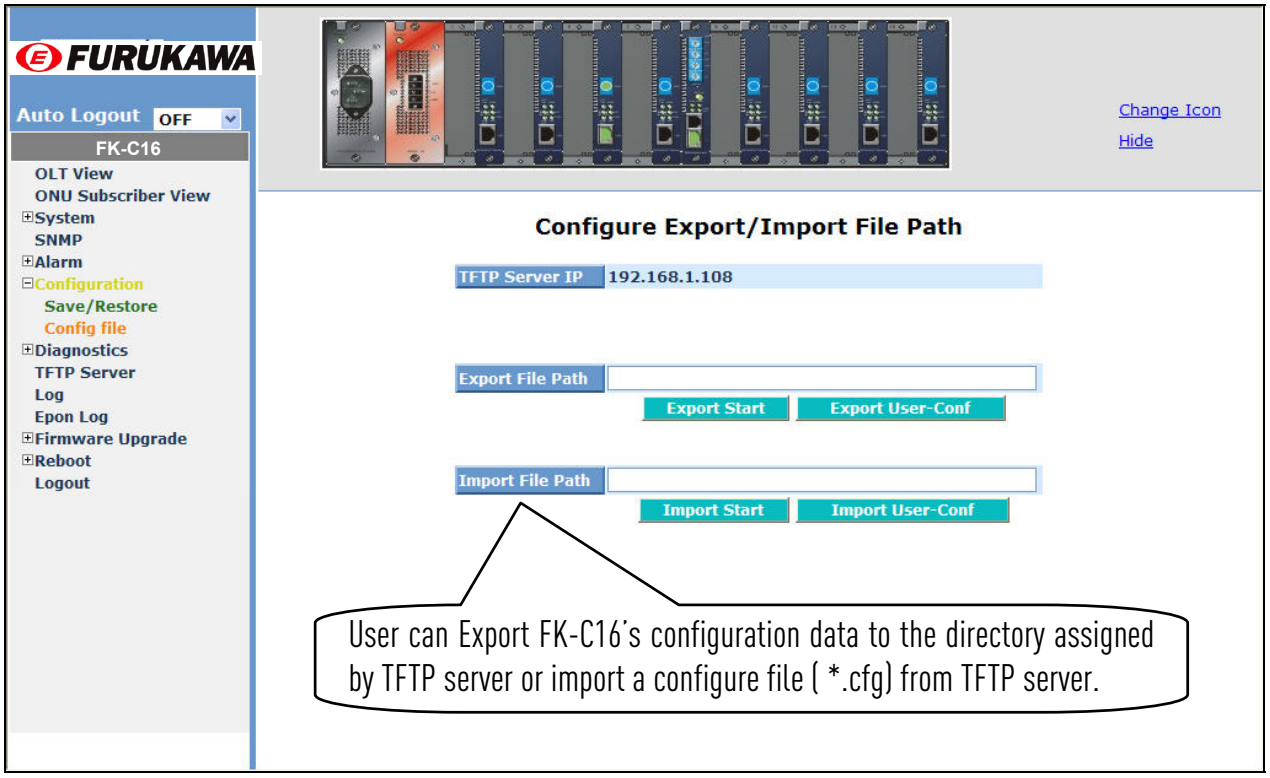
ONU Subscriber checked represents clean ONU Subscriber parts of Flash.

Miscellaneous checked represents clean CLI ONU User Rule and Field Select Template,OLT Reboot Time,Export Config Backup Setting

Restore User

Press <Restore User> button to restore user configuration, the user configuration file was saved by <Save User> button function.

3-9-2 Configure Export / Import File Path



Function description:

The entire FK-C16 chassis configuration could be saved into a file. You can use the function "Import Export Configuration". The new management module all of configurations will be recovered after the following procedures, except IP address. You have to configure the IP address first, because the recover configuration mechanism is based on TFTP function so that IP address needs to be ready first.

CENTRAL DE SERVIÇOS AO CLIENTE
0800 412100

Step 1.

Run "Save Start" configuration function.

Step 2.

Press "Export Start" button to save the entire configuration of a chassis to a file.

Step 3.

Press "Import Start" button to load the saved file and reinstall the complete configuration of the chassis.

Step 4.

Reboot Host.

Parameter description:

TFTP Server IP

Display the IP address of TFTP server you set up.

Export File Path

Key in the file and path name for exporting configuration file.

Import File Path

Key in the file and path name for importing configuration file.

Export Start

Press <Export Start> button to export the configuration file into TFTP server.

Export User-Conf

Press <Export User-Conf> button to export the user configuration file to TFTP server.

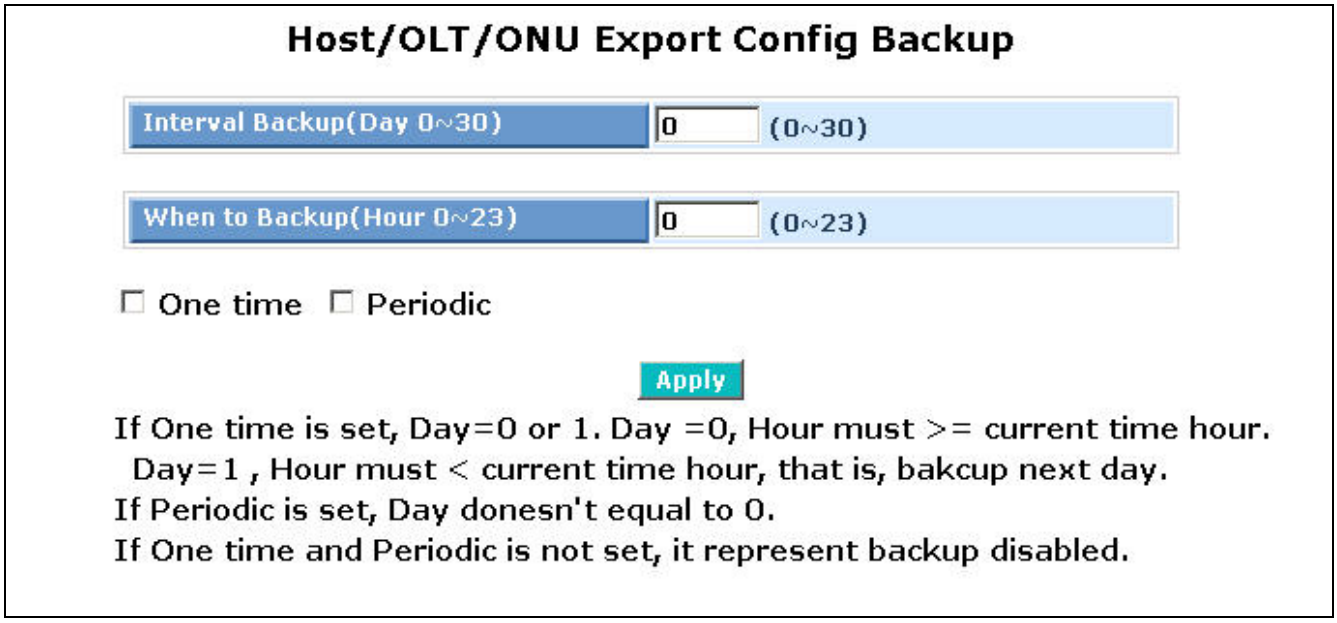
Import Start

Press <Import Start> button to import the configuration file into chassis's start memory block from TFTP server.

Import User-Conf

Press <Import User-Conf> button to import the configuration file into chassis's user memory block from TFTP server.

3-9-3 Host/OLT/ONU Export Config Backup


Host/OLT/ONU Export Config Backup
Interval Backup(Day 0~30)
0
(0~30)
When to Backup(Hour 0~23)
0
(0~23)
One time
Periodic
Apply
If One time is set, Day=0 or 1. Day =0, Hour must >= current time hour.
Day=1 , Hour must < current time hour, that is, bakcup next day.
If Periodic is set, Day donesn't equal to 0.
If One time and Periodic is not set, it represent backup disabled.

Function description:

The entire FK-C16 chassis configuration could be saved into a file. You can use the function "Import Export Configuration". The export config backup time can be scheduled. For example, (1)you export config file at 8 a.m. every day. Interval Backup is set 1. When to Backup is set 8. (2)If you export config file at 1 p.m. every two days. Interval Backup is set 2. When to Backup is set 13.

Parameter description:

Interval Backup

Display the backup interval that FK-C16 chassis export Host/OLT/ONU config file.

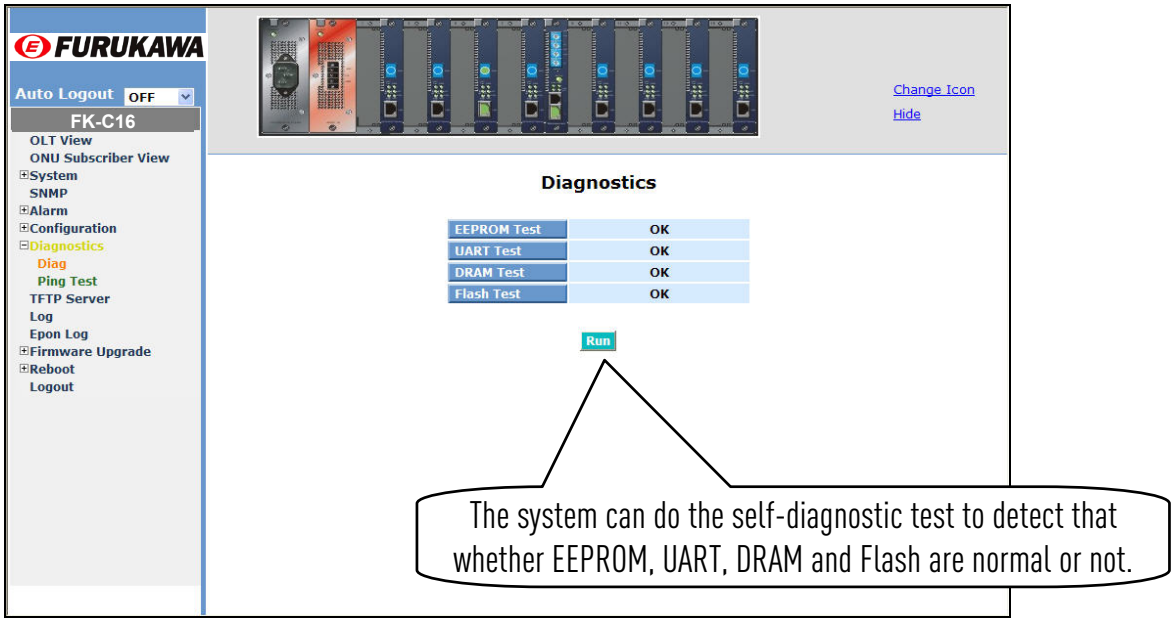
When to Backup

Display when FK-C16 chassis backup config file.

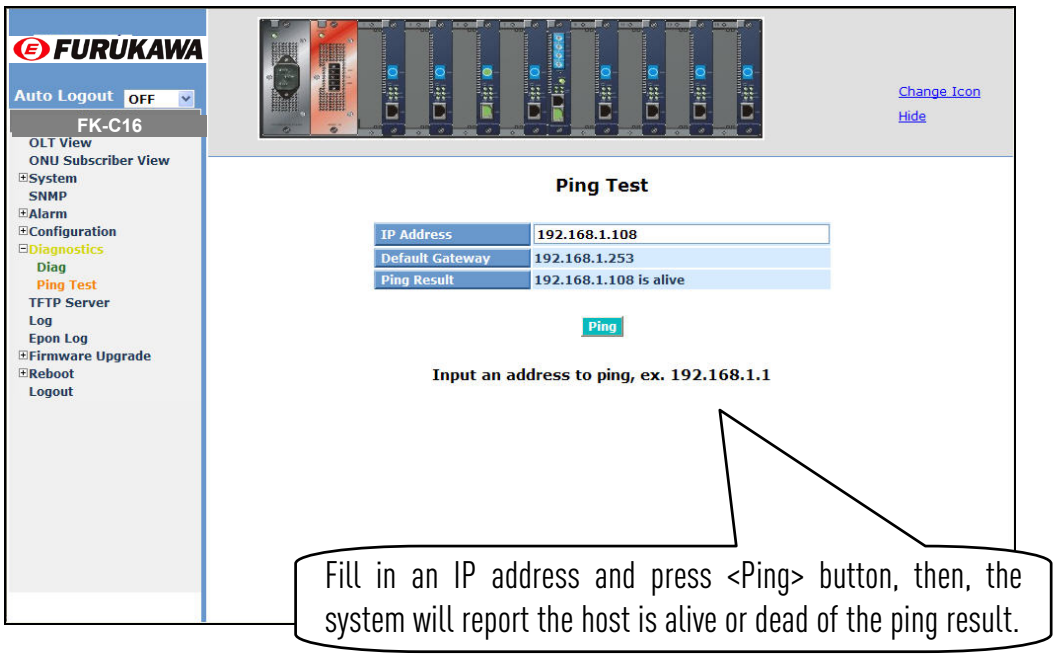
CENTRAL DE SERVIÇOS AO CLIENTE
0800 412100

3-10 Diagnostic

3-10-1 Diagnostic



3-10-2 Ping Test



Parameter description:

IP Address

An IP address with the version of v4, e.g. 192.168.1.1.

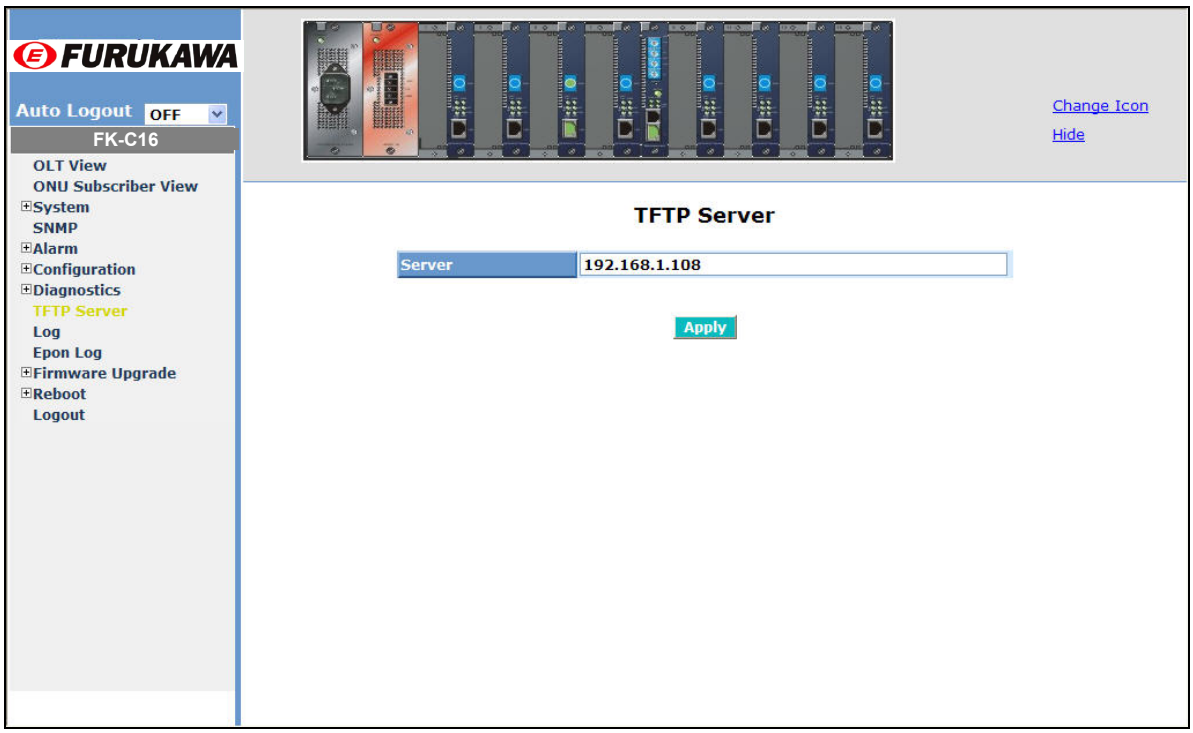
Default Gateway

IP address of the default gateway.

Ping Result

You can ping the remote station or converter chassis that connects to the managed port. It will show the Ping destination IP is alive. Otherwise, it shows destination is dead.

3-11 TFTP Server



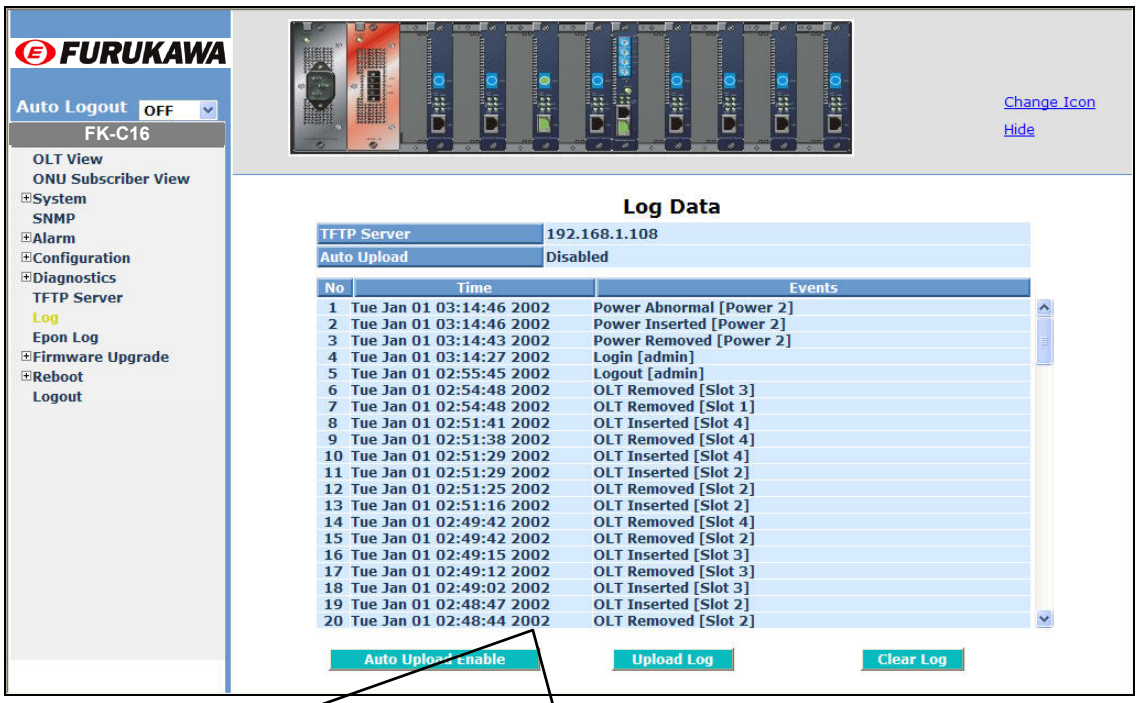
Parameter description:

TFTP Server

A TFTP server IP address location path you want to upgrade.

CENTRAL DE SERVIÇOS AO CLIENTE
0800 412100

3-12 Log Data


FURUKAWA
Auto Logout OFF
FK-C16
OLT View
ONU Subscriber View
System
SNMP
Alarm
Configuration
Diagnostics
TFTP Server
Log
Epon Log
Firmware Upgrade
Reboot
Logout
Change Icon
Hide
Log Data
TFTP Server 192.168.1.108
Auto Upload Disabled
No Time Events
1 Tue Jan 01 03:14:46 2002 Power Abnormal [Power 2]
2 Tue Jan 01 03:14:46 2002 Power Inserted [Power 2]
3 Tue Jan 01 03:14:43 2002 Power Removed [Power 2]
4 Tue Jan 01 03:14:27 2002 Login [admin]
5 Tue Jan 01 02:55:45 2002 Logout [admin]
6 Tue Jan 01 02:54:48 2002 OLT Removed [Slot 3]
7 Tue Jan 01 02:54:48 2002 OLT Removed [Slot 1]
8 Tue Jan 01 02:51:41 2002 OLT Inserted [Slot 4]
9 Tue Jan 01 02:51:38 2002 OLT Removed [Slot 4]
10 Tue Jan 01 02:51:29 2002 OLT Inserted [Slot 4]
11 Tue Jan 01 02:51:29 2002 OLT Inserted [Slot 2]
12 Tue Jan 01 02:51:25 2002 OLT Removed [Slot 2]
13 Tue Jan 01 02:51:16 2002 OLT Inserted [Slot 2]
14 Tue Jan 01 02:49:42 2002 OLT Removed [Slot 4]
15 Tue Jan 01 02:49:42 2002 OLT Removed [Slot 2]
16 Tue Jan 01 02:49:15 2002 OLT Inserted [Slot 3]
17 Tue Jan 01 02:49:12 2002 OLT Removed [Slot 3]
18 Tue Jan 01 02:49:02 2002 OLT Inserted [Slot 3]
19 Tue Jan 01 02:48:47 2002 OLT Inserted [Slot 2]
20 Tue Jan 01 02:48:44 2002 OLT Removed [Slot 2]
Auto Upload Enable
Upload Log
Clear Log

Record the time and the name of the trap events that had happened in the order of No.

Parameter description:

TFTP Server

User can upload all data in log to TFTP server if the TFTP is enabled. In the log, it can accommodate maximum 200 records, which means up to 200 records can be uploaded to TFTP server each time.

No.

Display the order number that the trap happened.

Time

Display the time that the trap happened.

Events

Display the trap event name.

Auto Upload

Press <Auto Upload Enable/Disable> button to enable/disable auto upload log data function. The Log Data maximum entry is 200. If the auto upload be enabled, the log data will be upload to TFTP server automatically when the data entries was over 200.

Upload Log

Press <Upload Log> button to upload log data function by manual. The Log Data will be upload to TFTP server when you use mouse to click left on <Upload Log> button.

Clear Log:

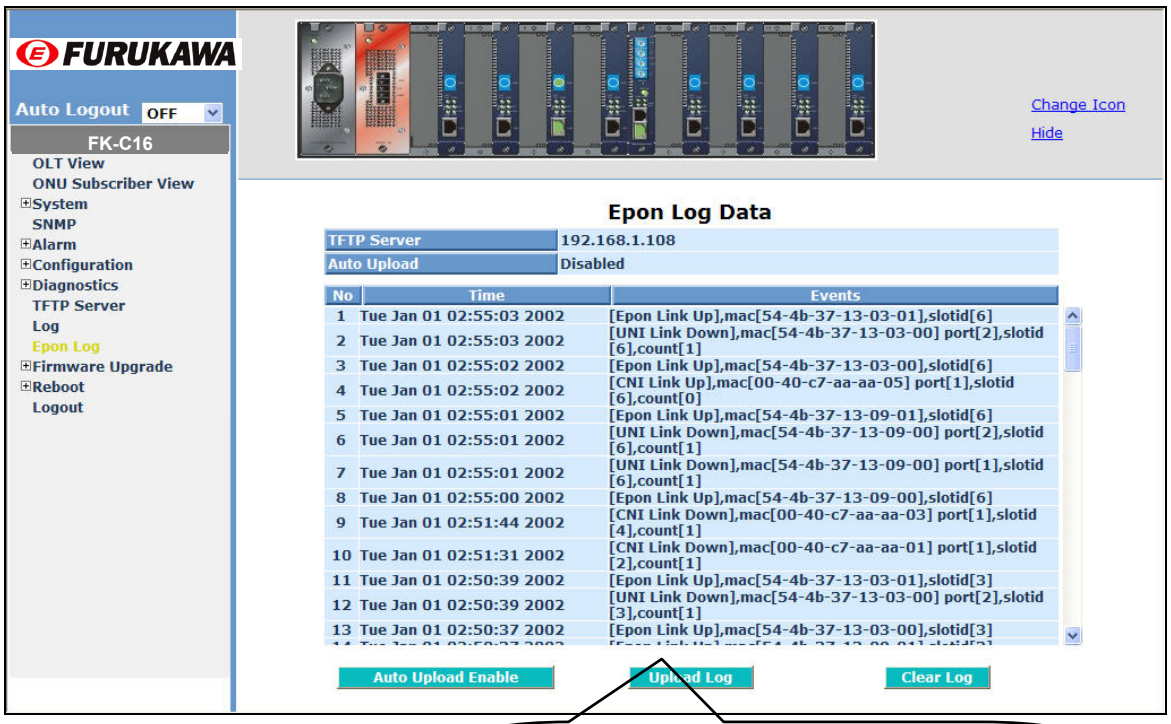
All of the log data will be deleted, when you use mouse to click left on <Clear Log> button.

Note:

- The trap event log massage of the Web UI and CLI are combined with the FK-C16 firmware, we cannot access and change the trap event log message from them.
- The FK-C16 supports SNMP trap function, the SNMP trap event message is defined in FK-C16 MIB file. The MIB file is a text file, it can be compiled into the SNMP NMS (for example: HP Open View, Castle Rock SNMPc, MG-Soft MIB Browser, etc.). The SNMP trap event message would be shown on the NMS trap receiver when the FK-C16 MIB file was compiled into the NMS and FK-C16 trap event had happened. You can access and change the MIB file for trap event message modification.

CENTRAL DE SERVIÇOS AO CLIENTE
0800 412100

3-13 EPON Log File


FURUKAWA
Auto Logout OFF
FK-C16
OLT View
ONU Subscriber View
System
SNMP
Alarm
Configuration
Diagnostics
TFTP Server
Log
Epon Log
Firmware Upgrade
Reboot
Logout
Change Icon
Hide
Epon Log Data
TFTP Server 192.168.1.108
Auto Upload Disabled
No Time Events
1 Tue Jan 01 02:55:03 2002 [Epon Link Up],mac[54-4b-37-13-03-01],slotid[6]
2 Tue Jan 01 02:55:03 2002 [UNI Link Down],mac[54-4b-37-13-03-00] port[2],slotid [6],count[1]
3 Tue Jan 01 02:55:02 2002 [Epon Link Up],mac[54-4b-37-13-03-00],slotid[6]
4 Tue Jan 01 02:55:02 2002 [CNI Link Up],mac[00-40-c7-aa-aa-05] port[1],slotid [6],count[0]
5 Tue Jan 01 02:55:01 2002 [Epon Link Up],mac[54-4b-37-13-09-01],slotid[6]
6 Tue Jan 01 02:55:01 2002 [UNI Link Down],mac[54-4b-37-13-09-00] port[2],slotid [6],count[1]
7 Tue Jan 01 02:55:01 2002 [UNI Link Down],mac[54-4b-37-13-09-00] port[1],slotid [6],count[1]
8 Tue Jan 01 02:55:00 2002 [Epon Link Up],mac[54-4b-37-13-09-00],slotid[6]
9 Tue Jan 01 02:51:44 2002 [CNI Link Down],mac[00-40-c7-aa-aa-03] port[1],slotid [4],count[1]
10 Tue Jan 01 02:51:31 2002 [CNI Link Down],mac[00-40-c7-aa-aa-01] port[1],slotid [2],count[1]
11 Tue Jan 01 02:50:39 2002 [Epon Link Up],mac[54-4b-37-13-03-01],slotid[3]
12 Tue Jan 01 02:50:39 2002 [UNI Link Down],mac[54-4b-37-13-03-00] port[2],slotid [3],count[1]
13 Tue Jan 01 02:50:37 2002 [Epon Link Up],mac[54-4b-37-13-03-00],slotid[3]
Auto Upload Enable
Upload Log
Clear Log

Record the time and the name of the EPON trap events that had happened in the order of No.

Parameter description:

TFTP Server

User can upload all data in EPON log to TFTP server if the TFTP is enabled. In the EPON log, it can accommodate maximum 200 records, which means up to 200 records can be uploaded to TFTP server each time.

No.

Display the order number that the EPON trap happened.

Time

Display the time that the EPON trap happened.

Events

Display the EPON trap event name.

Auto Upload

Press <Auto Upload Enable/Disable> button to enable/disable auto upload EPON log data function. The EPON Log Data maximum entry is 120. If the auto upload be enabled, the log data will be upload to TFTP server automatically when the data entries was over 120.

Upload Log

Press <Upload Log> button to upload log data function by manual. The EPON Log Data will be upload to TFTP server when you use mouse to click left on <Upload Log> button.

Clear Log

All of the EPON log data will be deleted, when you use mouse to click left on <Clear Log> button.

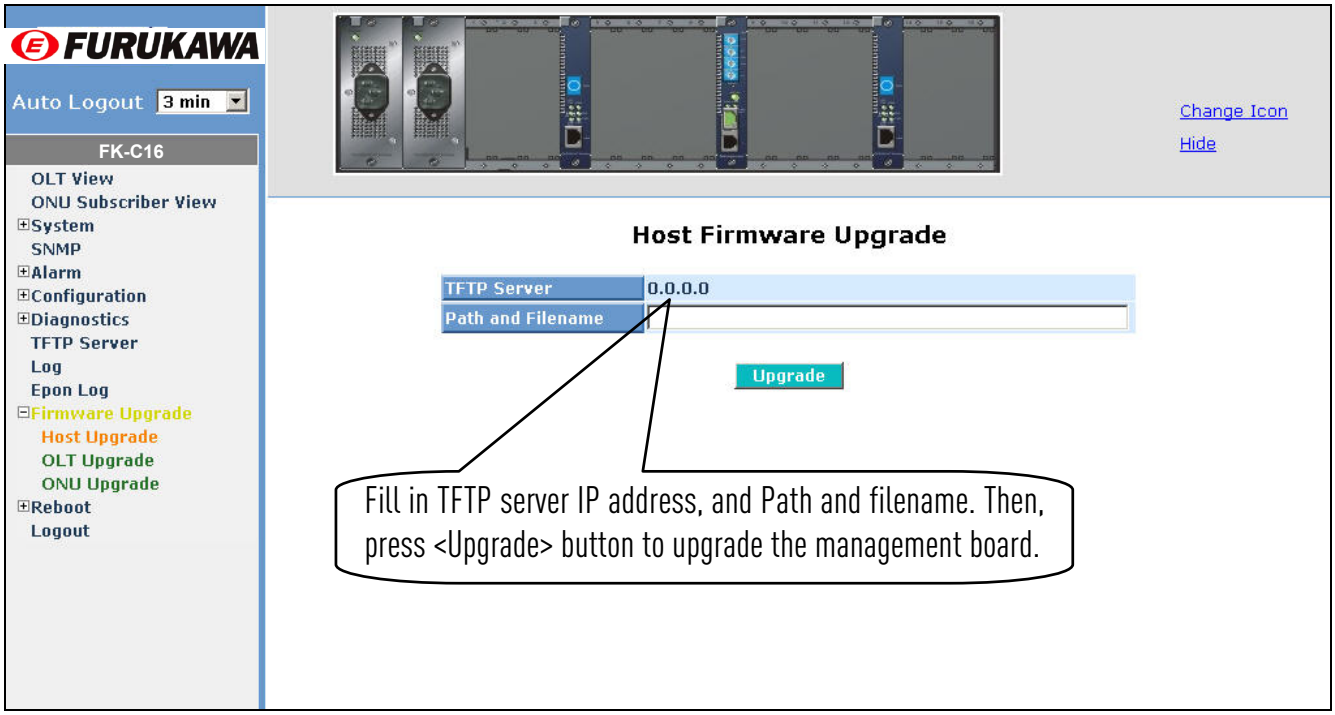
Note:

- The EPON trap event log massage of the Web UI and CLI are combined with the FK-C16 firmware, we cannot access and change the EPON trap event log message from them.
- The FK-C16 supports SNMP trap function, the SNMP trap event message is defined in FK-C16 MIB file. The MIB file is a text file, it can be compiled into the SNMP NMS (for example: HP Open View, Castle Rock SNMPc, MG-Soft MIB Browser, etc.). The SNMP trap event message would be shown on the NMS trap receiver when the FK-C16 MIB file was compiled into the NMS and FK-C16 trap event had happened. You can access and change the MIB file for trap event message modification.

CENTRAL DE SERVIÇOS AO CLIENTE
0800 412100

3-14 Firmware Upgrade

3-14-1 Host Firmware Upgrade



Parameter description:

TFTP Server

A TFTP server stored the image file you want to upgrade.

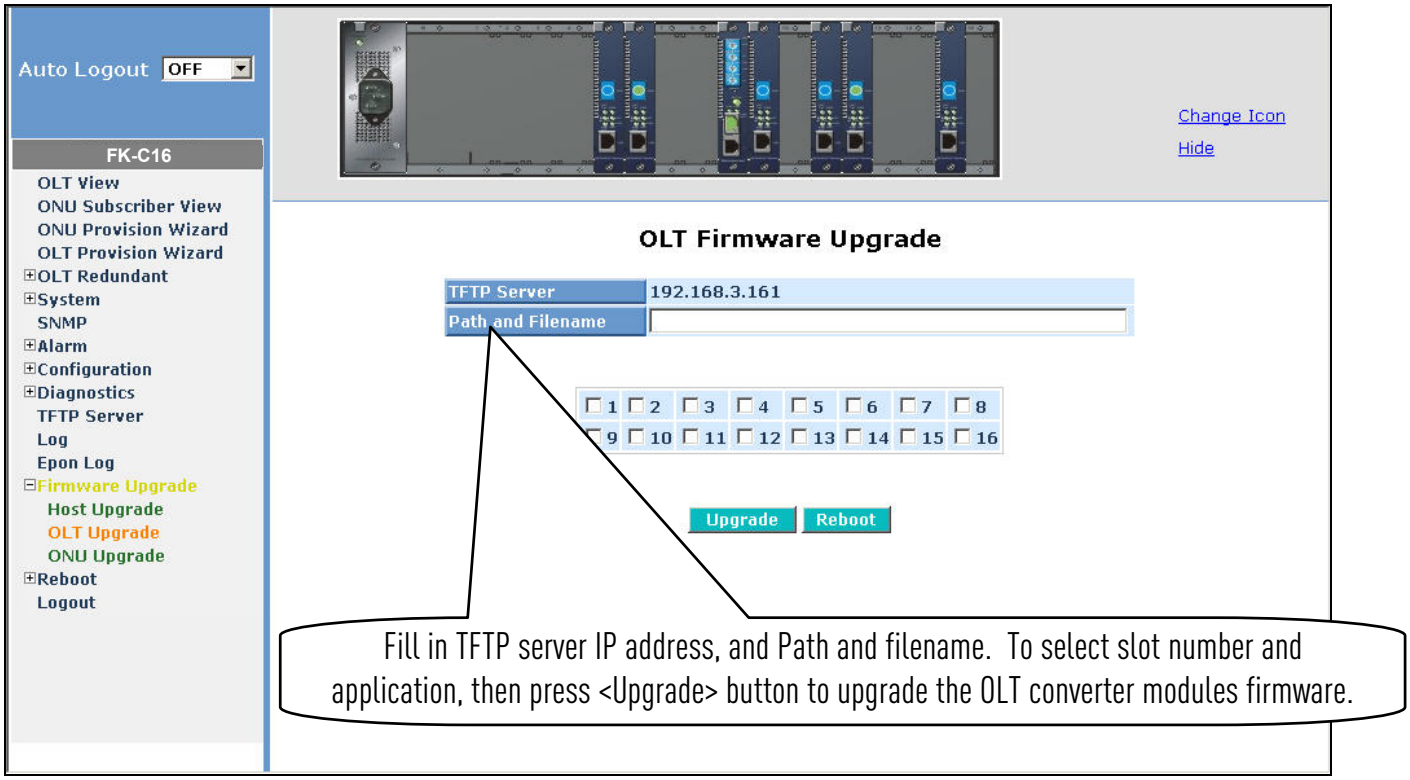
Path and Filename

File path and filename stored the image file you want to upgrade.

Upgrade

Click left on <Upgrade> button to run software upgrade.

3-14-2 OLT Upgrade



Parameter description:

TFTP Server

A TFTP server stored the image file you want to upgrade.

Path and Filename

File path and filename stored the image file you want to upgrade.

Slot

To select slot numbers for OLT firmware upgrade.

Upgrade

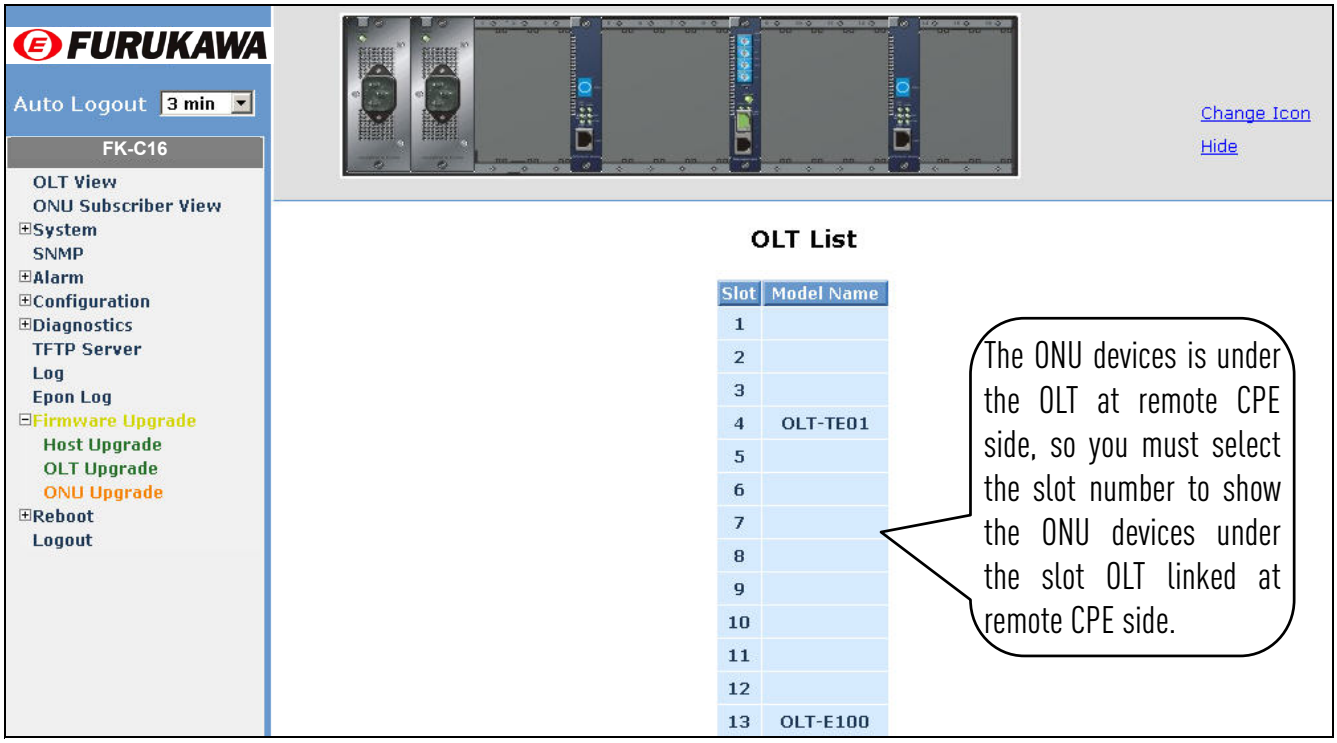
Click left on <Upgrade> button to run software upgrade.

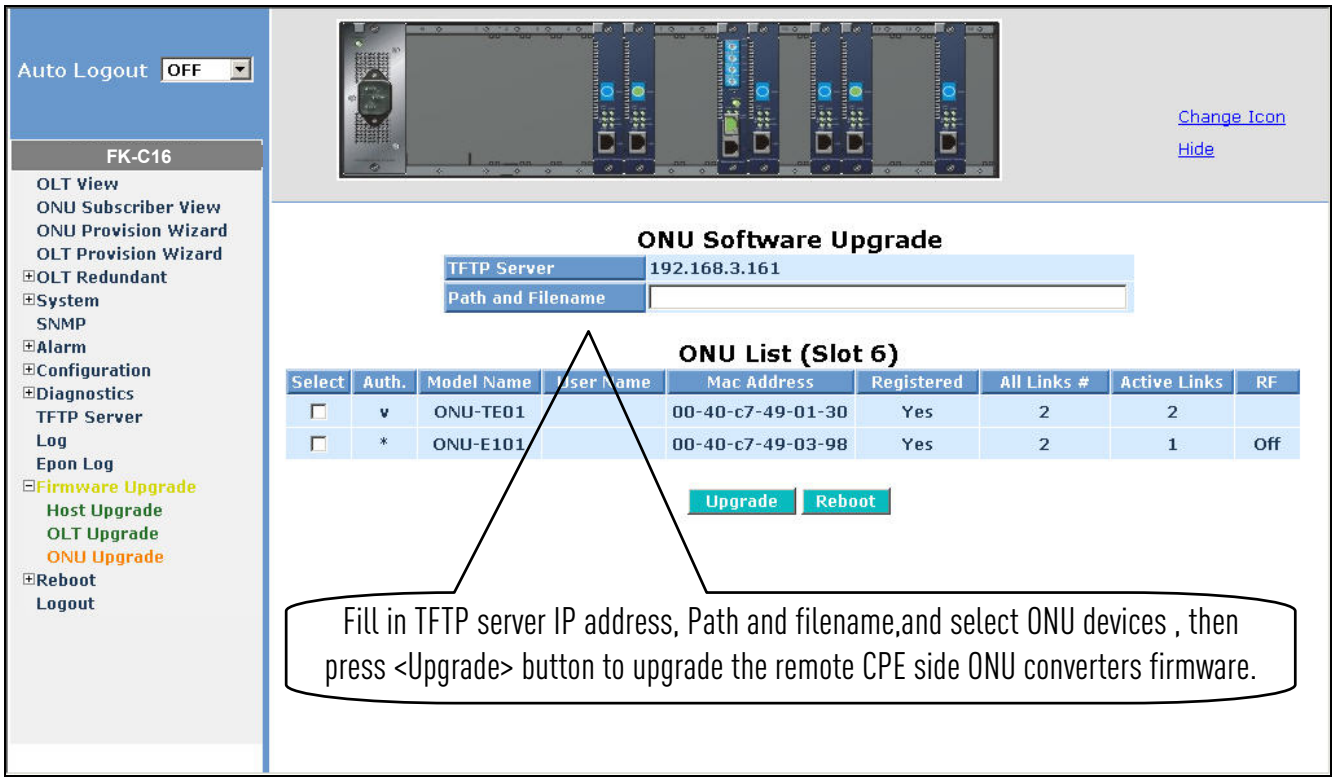
Reboot

Click left on <Reboot> button to reboot OLT.

CENTRAL DE SERVIÇOS AO CLIENTE
0800 412100

3-14-3 ONU Upgrade





Parameter description:

TFTP Server

A TFTP server stored the image file you want to upgrade.

Path and Filename

File path and filename stored the image file you want to upgrade.

Linked ONU Devices

To select ONU devices for firmware upgrade.

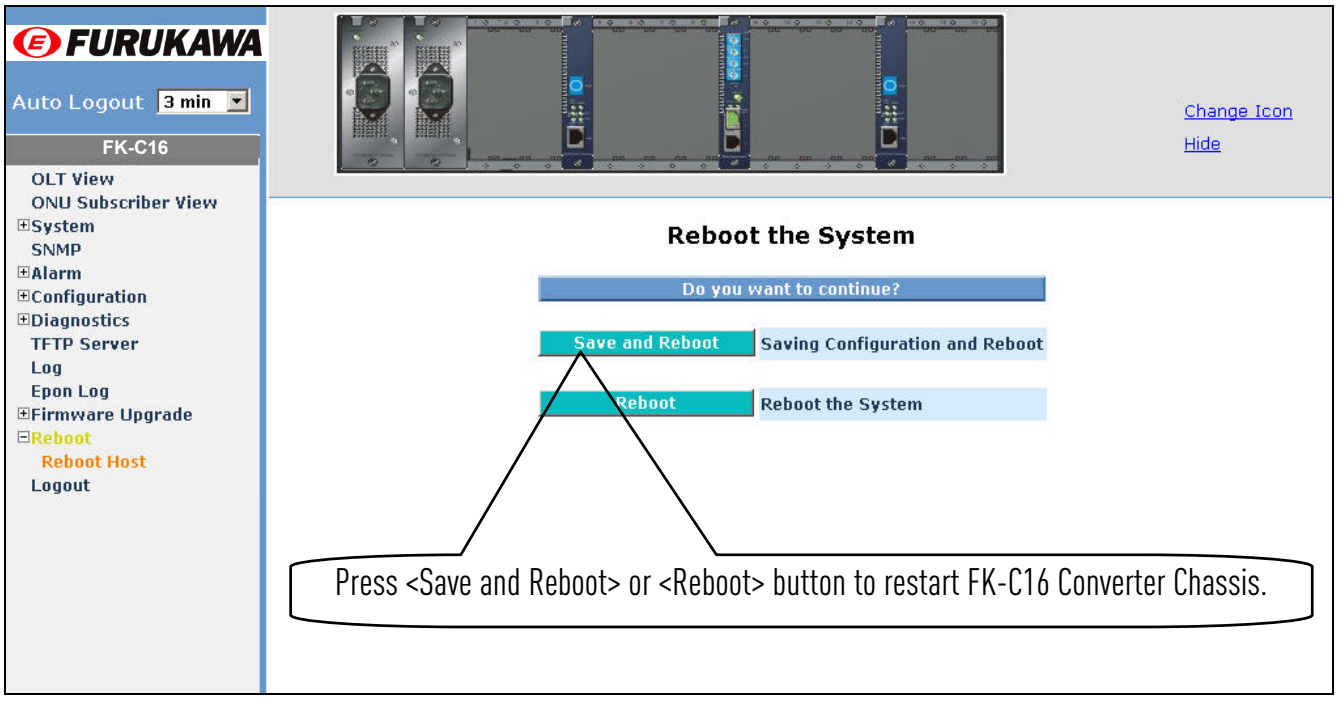
Upgrade

Click left on <Upgrade> button to run software upgrade.

Reboot

Click left on <Reboot> button to reboot ONU.

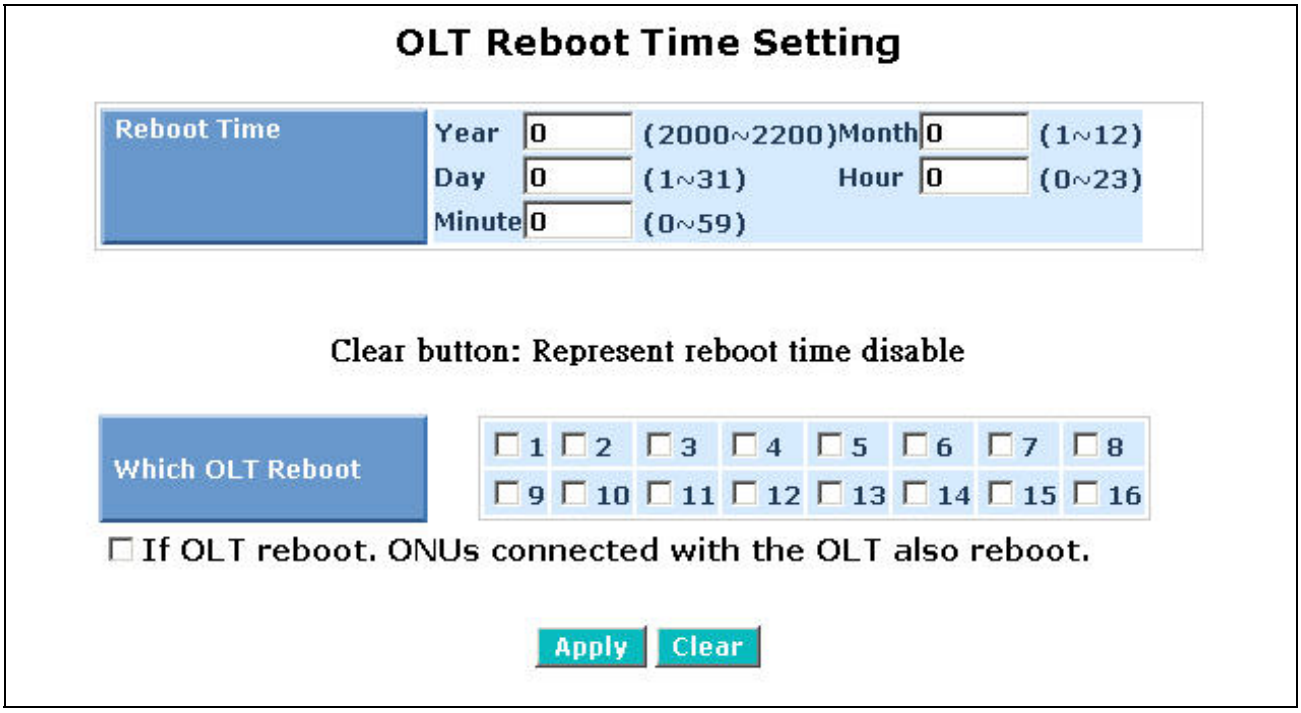
3-15 Reboot



Note: Reboot takes the same effect as the RESET button on the front panel of FK-C16. It will take around thirty (30) seconds to complete the system boot.

CENTRAL DE SERVIÇOS AO CLIENTE
0800 412100

3-15-1 OLT Reboot Time


OLT Reboot Time Setting
Reboot Time
Year 0 (2000~2200) Month 0 (1~12)
Day 0 (1~31) Hour 0 (0~23)
Minute 0 (0~59)
Clear button: Represent reboot time disable
Which OLT Reboot
1 2 3 4 5 6 7 8
9 10 11 12 13 14 15 16
If OLT reboot. ONUs connected with the OLT also reboot.
Apply
Clear

Function description:

OLT Reboot Time describe when OLT reboot. You can set Year, Month, Day, Hour, Minute in the future and select which OLT to reboot. For example Year is 2008,Month 11, Day 12,Hour 13, Minute 14 and Which OLT Reboot is 2,4,6. It represent the 2,4,6 OLT will reboot at 2008/11/12 13:14:xx.

Parameter description:

Reboot Time

Display the time that OLT reboot.

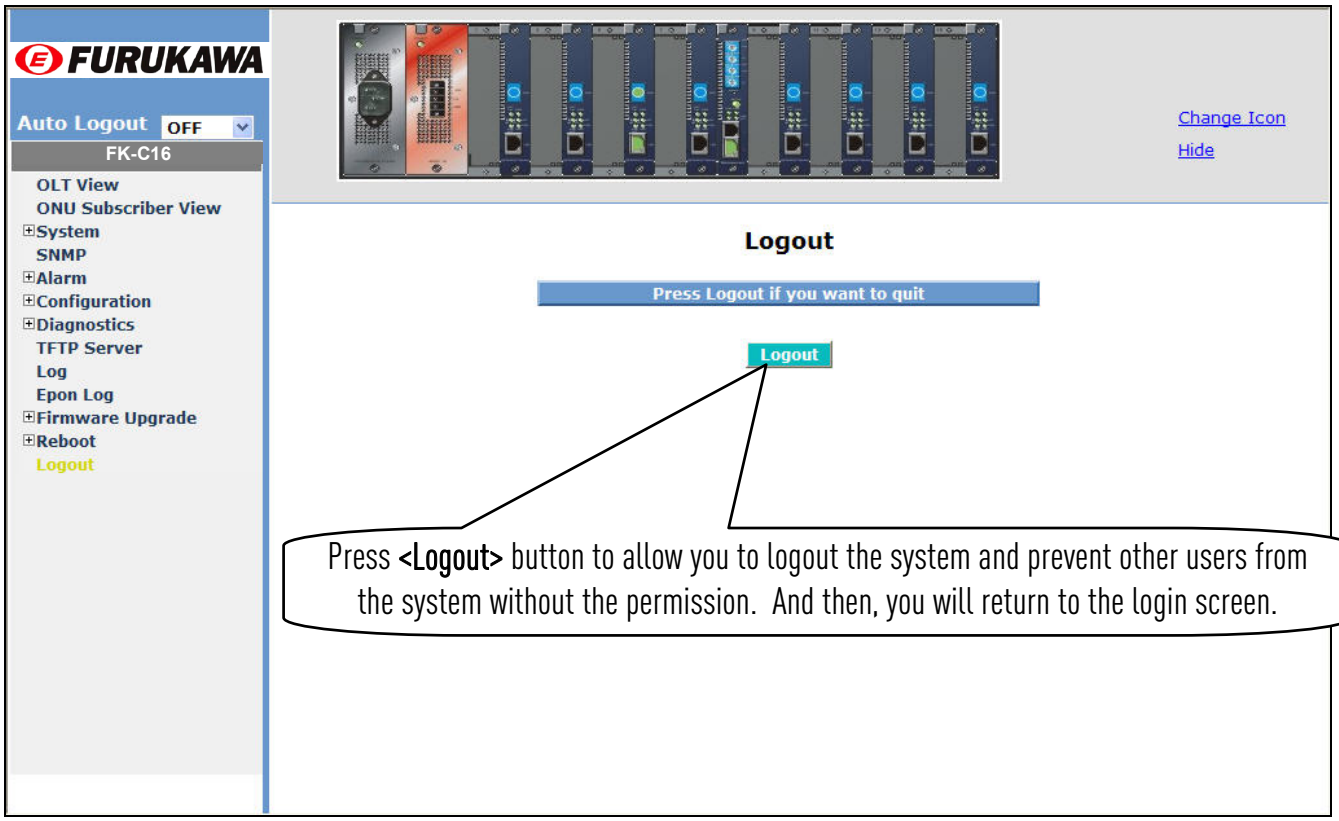
Which OLT Reboot

Display which OLT to reboot.

Clear

Clear setting in the page. After clicking Clear button, you must click Apply button.

3-16 Logout



Note: Pull down the <Auto Logout> list at the left-top corner to explicitly ON/OFF this logout function. If no action and no key is stroke as well in any function screen more than the minutes you set up, FK-C16 will have you logout automatically.

CENTRAL DE SERVIÇOS AO CLIENTE
0800 412100

Chapter 4 CLI Management

4-1 CLI Management

Refer to Chapter 2 for basic installation. The following description is the brief of the network connection.

1. Locate the correct DB-9 RS-232 cable with female DB-9 and Ear-Phone jack connector. RS-232 cable comes with the management chassis. Refer to the Appendix C for RS-232 serial cable specification.
2. Attach the Ear-Phone jack connector to the female Ear-Phone jack serial port connector on the Management board.
3. Attach the other end of the DB-9 cable to an ASCII terminal emulator or PC Com-1, 2 port. For example, PC runs Microsoft Windows HyperTerminal utility.
4. At "Com Port Properties" Menu, configure the parameters as below: (see the next section)

Baud rate	57600
Stop bits	1
Data bits	8
Parity	N
Flow control	none

4-1-1 Login

The command-line interface (CLI) is a text-based interface. User can access the CLI through either a direct serial connection to the device or a Telnet session. The default values of FK-C16 converter chassis are listed below:

Username: **admin**
Password: **admin**

After you login successfully, the prompt will be shown as "**#**" if you are the first login person; otherwise it may show "**$**". See the following two figures. The former means you behave as an administrator and have the access right of the system. As to the latter, it means you behave as a guest and are only allowed to view the system without the permission to do any setting for this Converter Chassis.

Furukawa Managed GEPON Chassis

Login: admin

Password:

FK-C16#

Furukawa Managed GEPON Chassis

Login: admin

Password:

FK-C16$

CENTRAL DE SERVIÇOS AO CLIENTE
0800 412100

4-2 Commands of CLI

To see the commands of the mode, please input "**?**" after the prompt, then all commands will be listed in the screen. All commands can be divided into two categories, including Global commands and Local commands. Global commands can be used wherever the mode you are. They are "end", "exit", "history", "help", "save start", "save user", "restore default", "restore user" and "logout". For more details, please refer to Section 4-2-1.

Command instructions reside in the corresponding modes are local commands. The same command with the same command name may occur but perform totally different function in different modes. For example, "show" in IP mode performs displaying the IP information; however, it performs displaying the system information in system mode. For more details, please refer to Section 4-2-2.

```
CR3816# ?
  account               Enter into account mode
  alarm                 Enter into alarm mode
  autologout            Change autologout time
  config-file           Enter into config file mode
  diag                  Enter into diag mode
  epon-log              Enter into epon log mode
  firmware              Enter into firmware mode
  hostname              Chang
  ip                    Enter into ip mode
  link                  Enter into Logical Link Management
  log                   Enter into log mode
  olt                   Enter into OLT Management
  onu                   Enter into ONU Management
  reboot                Reboot the Host CPU
  reboot-module         Reboot Module(OLT)
  snmp                  Enter into snmp mode
  system                Enter into system mode
  tftp                  Enter into tftp mode
  time                  Enter into time mode

  ------------<< Global commands >>------------
  end                   Back to the top mode
  exit                  Back to the previous mode
  help                  Show available commands

...(q to quit)
```

4-2-1 Global Commands of CLI

exit

Syntax:

exit

Description:

Back to the previous mode.

When you enter this command, your current position would move back to the previous mode. If you use this command in the top mode, you are still in the position of the top mode.

Argument:

None.

Possible value:

None.

Example:

FK-C16# system

FK-C16(system)# exit

FK-C16#

end

Syntax:

end

Description:

Back to the top mode.

When you enter this command, your current position would move to the top mode. If you use this command in the top mode, you are still in the position of the top mode.

Argument:

None.

CENTRAL DE SERVIÇOS AO CLIENTE
0800 412100

Possible value:

None.

Example:

FK-C16# alarm

FK-C16(alarm)# events

FK-C16(alarm-events)# end

FK-C16#

help

Syntax:

help

Description:

To show available commands.

Some commands are the combination of more than two words. When you enter this command, the CLI would show the complete commands. Besides, the command would help you classify the commands between the local commands and the global ones.

Argument:

None.

Possible value:

None.

Example:

FK-C16# ip

FK-C16(ip)# help

Commands available:

----------<< Local commands >>----------

account	Enter into account mode
alarm	Enter into alarm mode
autologout	Change autologout time
config-file	Enter into config file mode
diag	Enter into diag mode
epon-log	Enter into epon log mode
firmware	Enter into firmware mode
hostname	Change hostname
ip	Enter into ip mode
link	Enter into Logical Link Management
log	Enter into log mode
olt	Enter into OLT Management
onu	Enter into ONU Management
reboot	Reboot the Host CPU
reboot-module	Reboot Module(OLT)
snmp	Enter into snmp mode
system	Enter into system mode
tftp	Enter into tftp mode
time	Enter into time mode

CENTRAL DE SERVIÇOS AO CLIENTE
0800 412100

```
------------<< Global commands >>------------
```

end	Back to the top mode
exit	Back to the previous mode
help	Show available commands
history	Show a list of previously run commands
logout	Logout the system
restore	Restore default or user config
save	Save as start or user config
oltlinks	Show Both Discovered And Blocked Links Of an OLT
Onuname	Show onu name
Onulinks	Show onu links and bridge mode
param OLT	Hint OLT parameter
param SLOTs	Hint SLOTs parameter
param ONU	Hint ONU parameter
param LINK	Hint LINK parameter

history

Syntax:

history [#]

Description:

To show a list of previously run commands.

When you enter this command, the CLI would show a list of previously run commands which typed before. The CLI supports the records up to 256 records. If no argument is typed, the CLI would list total records up to 256. If optional argument is given, the CLI would show the only last number of records, given by the argument.

Argument:

[#]: show last number of history records. (optional)

Possible value:

[#]: 1, 2, 3, ..., 256.

Example:

FK-C16(ip)# history

Command history:

0. ?

1. remote

2. exit

3. alarm

4. events

5. end

6. help

7. ip

8. help

9. history

FK-C16(ip)# history 3

Command history:

8. help

9. history

10. history 3

FK-C16(ip)#

CENTRAL DE SERVIÇOS AO CLIENTE
0800 412100

logout

Syntax:

logout

Description:

When you enter this command via Telnet connection, you would logout the system and disconnect. If you connect the system through direct serial port with RS-232 cable, when you enter this command, you would logout the system and back to the initial login prompt.

Argument:

None.

Possible value:

None.

Example:

FK-C16# logout

save start

Syntax:

save start

Description:

To save the current configuration as the startup one. When you enter this command, the CLI would save your current configuration into the non-volatile FLASH. If you want the configuration still works after rebooting, save the configuration using the command 'save stat'.

Argument:

None.

Possible value:

None.

Example:

FK-C16# save start

Saving ...

Save Successfully

save user

Syntax:

save user

Description:

To save the current configuration as the user-defined configuration. When you enter this command, the CLI would save your current configuration into the non-volatile FLASH as user-defined configuration.

Argument:

None.

Possible value:

None.

Example:

FK-C16# save user

Saving ...

Save Successfully

restore default

Syntax:

restore default

Description:

To restore the startup configuration as factory default configuration. If restoring default successfully, the CLI would prompt if reboot immediately or not. If you press Y or y, the system would reboot immediately; others would back to the CLI system. After restoring default configuration, all the changes in the startup configuration would be lost. After rebooting, the entire startup configuration would reset to factory default.

Argument:

None.

Possible value:

None.

CENTRAL DE SERVIÇOS AO CLIENTE
0800 412100

Example:

FK-C16# restore default

Restoring ...

Restore default configuration successfully.

Press Y or y to reboot, others to exit : y

restore user

Syntax:

restore user

Description:

To restore the startup configuration as user defined configuration. If restoring default successfully, the CLI would prompt if reboot immediately or not. If you press Y or y, the system would reboot immediately; others would back to the CLI system. After restoring user-defined configuration, all the changes in the startup configuration would be lost. After rebooting, the entire startup configuration would replace as user defined one.

Argument:

None.

Possible value:

None.

Example:

FK-C16# restore user

Restoring ...

Restore user configuration successfully.

Press Y or y to reboot, others to exit : y

4-2-2 EPON Global Commands of CLI

EPON parameter include <OLT>, <SLOTs>, <ONU> and <LINK>. You can type "param XXX" to show the meaning of these parameter.

oltlinks

Syntax:

oltlinks <OLT>

Description:

Show Both Discovered And Blocked Links Of An OLT.

Argument:

<OLT> a single slot number of the target OLT.

Possible value:

<OLT> 1 to 16 (slot number).

Example:

FK-C16# oltlinks 6

onuname

Syntax:

Onuname <page>

Description:

Show onu name.

Argument:

<page> show onu onuname by page.

Possible value:

<page> one page is 64 entry. page 0 : show all entry.

Example:

FK-C16# onuname 1

CENTRAL DE SERVIÇOS AO CLIENTE
0800 412100

onulinks

Syntax:

onulinks <OLT> <ONU>

Description:

Show onu links and bridge mode.

Argument:

<OLT> a single slot number of the target OLT.

<ONU> the target ONU.

Possible value:

<OLT> 1 to 16 (slot number).

<ONU> onuMAC or onuAlias.

Example:

FK-C16# onulinks 6 nankang1

param OLT

Syntax:

param <OLT>

Description:

Hint OLT parameter.

Argument:

None.

Possible value:

None.

Example:

FK-C16# param OLT

OLT ::= a single slot number of the target OLT. Valid value is from 1 to 16.

0 is also a valid value.When onuAlias is chosen to be used in a CLI command including argument sequence like <OLT> <ONU> or <OLT> <LINK>, a zero value of <OLT> makes the CLI system to find the actual Slot number of the OLT in the ONU Subscriber Information table.

param SLOTs

Syntax:

param <SLOTs>

Description:

Hint SLOTs parameter.

Argument:

None.

Possible value:

None.

Example:

FK-C16# param SLOTs

SLOTs::= multi-slots(olt) representation.

e.g. If 2,5-7,9,11,14-16 is the value of <SLOTs>, slot 2,5,6,7,9,11,14,15,16 are the target objects of a CLI command.

param ONU

Syntax:

param <ONU>

Description:

Hint ONU parameter.

CENTRAL DE SERVIÇOS AO CLIENTE
0800 412100

Argument:

None.

Possible value:

None.

Example:

FK-C16# param ONU

ONU ::= <onuMAC | onuAlias>

onuMAC ::= MAC address of the target ONU.

onuAlias ::= the [User Name] field of an entry in the ONU Subscriber Information table

param LINK

Syntax:

param <LINK>

Description:

Hint LINK parameter.

Argument:

None.

Possible value:

None.

Example:

FK-C16# param LINK

LINK ::= <linkMAC | onuMAC:linkIndex | onuAlias:linkIndex>

linkMAC ::= MAC address of the target logical link.

linkIndex ::= an offset (N) appended to <ONU>.

to specify the N-th logical link of an ONU. (N>=0 and N<8)

e.g. 00-40-c7-49-01-19, 00-40-c7-49-01-18:1, nankang1:1

4-2-3 EPON Management Command of CLI

This section describes other local commands for EPON system management.

4-2-3-1 OLT VIEW

show port-status

Syntax:

show port-status

Description:

Displays model name and port status of all OLTs in the system.

Argument:

None.

Possible value:

None.

Example:

FK-C16(olt)# show port-status

4-2-3-2 OLT Port Config

set-port state

Syntax:

set-port state <SLOTs> <port> <enable|disable>

Description:

Configuring the management status of both CNI and Epon port on an OLT.

Argument:

<SLOTs> the target OLT slot(s).

<port> the target port number.

Possible value:

<SLOTs> 1~16; separator character: ",”; range character: "-".

<port> 0 -> EPON port; 1 -> CNI port.

CENTRAL DE SERVIÇOS AO CLIENTE
0800 412100

Example:

FK-C16(olt)# set-port state 6 0 disable

FK-C16(olt)# set-port state 1-6,10,12 0 enable

set-port auto-nego

Syntax:

set-port auto-nego < SLOTs > <port> <enable|disable>

Description:

Configuring Auto Negotiation state of the CNI port on an OLT.

Argument:

<SLOTs> the target OLT slot(s).

<port> the target port number.

Possible value:

<SLOTs> 1~16; separator character: ",”; range character: "-".

<port> 1 -> CNI port.

Example:

FK-C16(olt)# set-port auto-nego 6 1 disable

set-port speed

Syntax:

set-port speed <SLOTs> <port> <100|1000>

Description:

Configuring line speed of the CNI port on an OLT.

Argument:

<SLOTs> the target OLT slot(s).

<port> the target port number.

<100|1000> port speed.

Possible value:

<SLOTs> 1~16; separator character: ",”; range character: "-".

<port> 1-> CNI port.

<100|1000> 100 -> 100 Mbps; 1000 -> 1000Mbps.

Example:

FK-C16(olt)# set-port speed 6 1 100

FK-C16(olt)# set-port speed 1-6,8 1 1000

set-port flow-control (not support currently)

Syntax:

set-port flow-control <SLOTs> <port> <enable|disable>

Description:

Configuring flow control state of the CNI port of an OLT.

Argument:

<SLOTs> the target OLT slot(s).

<port> the target port number.

Possible value:

<SLOTs> 1~16; separator character: ",”; range character: "-".

<port> 1-> CNI port.

Example:

FK-C16(olt)# set-port flow-control 6 1 enable

FK-C16(olt)# set-port flow-control 2-6,10,12-15 1 disable

CENTRAL DE SERVIÇOS AO CLIENTE
0800 412100

4-2-3-3 OLT Statistics

show port-statistics

Syntax:

show port-statistics <OLT> <port> <direction>

Description:

To show statistics related to the specified port.

Argument:

<OLT> a single slot number of the target OLT.

<port> 0-EPON port , 1-OLT CNI Port.

<direction> 0-upstream 1-downstream.

Possible value:

<OLT> 1 to 16 (slot number).

<port> 0, 1.

<direction > 0, 1.

Example:

FK-C16(olt-sta)# show port-statistics 6 0 0

clear olt-counter

Syntax:

clear olt-counter <OLT>

Description:

Clear all olt counter.

Argument:

<OLT> a single slot number of the target OLT.

Possible value:

<OLT> 1 to 16 (slot number).

Example:

FK-C16(olt-sta)# clear olt-counter 6

4-2-3-4 OLT Information

show oltInfo

Syntax:

show oltInfo <SLOTs>

Description:

Displays detailed description about OLT(s).

Argument:

<SLOTs> the target OLT slot(s).

Possible value:

<SLOTs> 1~16; separator character: ",”; range character: "-".

Example:

FK-C16(olt)# show oltInfo 1-16

FK-C16(olt)# show oltInfo 6

4-2-3-5 OLT Traffic Mgmt

showtmp clause

Syntax:

showtmp clause [<clause no>]

Description:

To Show olt clause template.

Argument:

<clause no> clause template index, available from 0 to 19.

Possible value:

<clause no> 0 to 19.

CENTRAL DE SERVIÇOS AO CLIENTE
0800 412100

Example:

FK-C16(olt-tm)# showtmp clause 0

FK-C16(olt-tm)# showtmp clause

edittmp clause

Syntax:

editmp clause <clause no> <field selects value> <op> <type> <value>

Description:

Edit olt clause template.

Argument:

<clause no> clause template index, available from 0 to 19.

<field selects value> (using "hint clause" value).

<op> operator.

<type> value type , 0:Hex, 1:Decimal, a:automatic. When field is User, can't select type automatically.

<value> operation value, 6 bytes value.

Possible value:

< clause no > 0 to 19.

<field selects value> 0 to 10.

<op> 0 to 7.

<type> 0 |1|a

<value> 6 byte hex value.

Example:

FK-C16(olt-tm)# editmp clause 0 3 1 a 001122334455

hint clause

Syntax:

hint clause

Description:

Hint olt clause.

Argument:

None.

Possible value:

None.

Example:

FK-C16(olt-tm)# hint clause

When you want to set up a olt filter rule, you must follow below steps:

Step 1. hint clause(in order to see the value that you want to match)

step 2. editmp clause(edit a clause template)

step 3. apply oltportfilter

When you want to set up a onu rule, you must follow below steps:

Step 1. hint clause(in order to see the value that you want to match)

step 2. editmp clause(edit a clause template)

step 3. editmp action(edit a action template)

step 4. editmp rule(edit a rule template)

step 5. apply rule

The step numbers of setting up onu rule is more than the step numbers of setting up olt rule.

apply oltportfilter

Syntax:

apply oltportfilter <OLT> <port> <priority(0-3)> <clause no> <clause no> ...

Description:

Apply olt port filter rule.

CENTRAL DE SERVIÇOS AO CLIENTE
0800 412100

Argument:

<OLT> a single slot number of the target OLT.

<port> OLT port no, 0-epon port(upstream), 1-uplink port(downstream).

<priority(0-3)> filter rule priority. Suggested value: 3.

<clause no> clause template index, available from 0 to 19.

Possible value:

<OLT> 1 to 16 (slot number).

<port> 0, 1.

<priority(0-3)> 0 to 3.

<clause no > 0 to 19.

Example:

FK-C16(olt-tm)# apply oltport 6 3 5 0

apply oltlinkfilter

Syntax:

apply oltlinkfilter <OLT> <LINK> <priority(0-3)> <clause no> <clause no> ..

Description:

Apply olt link filter rule.

Argument:

<OLT> a single slot number of the target OLT.

<LINK> logical link identificator.

<priority(0-3)> filter rule priority, suggested value: 3.

<clause no> clause template index, available from 0 to 19.

Possible value:

<OLT> 1 to 16 (slot number).

<LINK> linkMAC or onuMAC:linkIndex or onuAlias:linkIndex (link index range: 0 to 7).

<priority(0-3)> 0 to 3.

<clause no > 0 to 19.

Example:

FK-C16(olt-tm)# apply oltlink 6 nankang1 3 0 or

FK-C16(olt-tm)# apply oltlink 6 00-40-c7-49-01-30 3 0

show oltportfilter

Syntax:

show oltportfilter <OLT> <port>

Description:

Show olt port filter rule.

Argument:

<OLT> a single slot number of the target OLT.

<port> OLT port no, 0-epon port(upstream), 1-uplink port(downstream).

Possible value:

<OLT> 1 to 16 (slot number).

<port> 0, 1.

Example:

FK-C16(olt-tm)# show oltportfilter 6 0

show oltlinkfilter

Syntax:

show oltlinkfilter <OLT> <LINK>

Description:

Show olt link filter rule.

CENTRAL DE SERVIÇOS AO CLIENTE
0800 412100

Argument:

<OLT> a single slot number of the target OLT.

<LINK> logical link identificator.

Possible value:

<OLT> 1 to 16 (slot number).

<LINK> linkMAC or onuMAC:linkIndex or onuAlias:linkIndex (link index range: 0 to 7).

Example:

FK-C16(olt-tm)# show oltlink 6 nankang1 or

FK-C16(olt-tm)# show oltlink 6 00-40-c7-49-01-30

del oltportfilter

Syntax:

del oltportfilter <OLT> <port> <no>

Description:

Del olt port filter rule.

Note: Before running del oltportfilter command, you must run show oltportfilter.

Argument:

<OLT> a single slot number of the target OLT.

<port> OLT port no, 0-epon port, 1-uplink port.

<no> olt filter rule no.

Possible value:

<OLT> 1 to 16 (slot number).

<port> 0, 1

<no> 1, 2 ..(rule number)

Example:

FK-C16(olt-tm)# del oltportfilter 6 1 1

del oltlinkfilter

Syntax:

del oltlinkfilter <OLT> <LINK> <no>

Description:

Del olt link filter rule.

Argument:

<OLT> a single slot number of the target OLT.

<LINK> logical link identificator.

<no> olt filter rule no.

Possible value:

<OLT> 1 to 16 (slot number).

<LINK> linkMAC or onuMAC:linkIndex or onuAlias:linkIndex (link index range: 0 to 7).

<no> 1, 2 ..(rule number).

Example:

FK-C16(olt-tm)# del oltlink 6 nankang1 1

show dynabrdgentry

Syntax:

show dynabrdgentry <OLT>

Description:

Display the automatically learned MAC addresses for all Logical Links of the given OLT. Dynamic MAC entries will be automatically removed if ANY of the following events should occur:

1. The link's SLAs are disabled or enabled

2. The bridging mode is changed

3. The link departs the network

4. Upstream SLA is modified such that link's priority changes (priority change requires a new link index to be registered for that logical link).

Argument:

<OLT> a single slot number of the target OLT.

Possible value:

<OLT> 1 to 16 (slot number).

CENTRAL DE SERVIÇOS AO CLIENTE
0800 412100

Example:

FK-C16(olt-tm)# show dynabrdgentry 6

clear oltdynatable

Syntax:

clear oltdynatable <OLT>

Description:

clear the whole dynamic MAC table for all Logical Links for the given OLT.

Argument:

<OLT> a single slot number of the target OLT.

Possible value:

<OLT> 1 to 16 (slot number).

Example:

FK-C16(olt-tm)# clear oltdynatable 6

clear linkdynatable

Syntax:

clear linkdynatable <OLT> <LINK>

Description:

clear some dynamic MAC entries for one Logical Links of the given OLT.

Argument:

<OLT> a single slot number of the target OLT.

<LINK> logical link identificator.

Possible value:

<OLT> 1 to 16 (slot number).

<LINK> linkMAC or onuMAC:linkIndex or onuAlias:linkIndex (link index range: 0 to 7).

Example:

FK-C16(olt-tm)# clear linkdynatable 6 00-40-c7-49-01-30

4-2-3-6 OLT DBA

set dba-ddw

Syntax:

set dba-ddw < SLOTs > <default|<level 0> <level 1>>

Description:

set OLT DBA parameters. The details illustrates in session 3-2-6-1.

Argument:

<SLOTs> the target OLT slot(s).

default: default value.

level 0: The drop down weight is used in level 1.

level 1: The drop down weight is used in level 2.

Possible value:

<SLOTs> 1~16; separator character: ",”; range character: "-".

default: level 0 = level 1 =4.

level 0: 0 to 256.

level 1: 0 to 256.

Example:

FK-C16(olt-dba)# set dba-ddw 6 64 16

Or

FK-C16(olt-dba)# set dba-ddw 6 default

show dba-ddw

Syntax:

show dba-ddw < SLOTs >

Description:

Show DBA Drop Down Weight value. The details illustrates in session 3-2-6-1.

Argument:

<SLOTs> the target OLT slot(s).

CENTRAL DE SERVIÇOS AO CLIENTE
0800 412100

Possible value:

<SLOTs> 1~16; separator character: ",”; range character: "-".

Example:

FK-C16(olt-dba)# show dba-ddw 6

OLT 6) DBA Drop Down Weights

Level 0 : 64 KBytes

Leval 1 : 16 KBytes

set broadcast-sla

Syntax:

set broadcast-sla <OLT> <maxBw> <minBw> <MaxBurst> <mode>

Description:

Set broadcast SLA parameters. If the state is disabled, you don't input the other arguments. If the state is enabled, you must input maxBw, minBw, MaxBust, and mode. That set DBA Priority Range should only be performed on a disabled OLT with no links registered. The details illustrates in session 3-2-6-2.

Argument:

<OLT> a single slot number of the target OLT.

<maxBw> Maximum Allowed Bandwidth.

<minBw> Minimum Guaranteed Bandwidth.

<MaxBurst> Max Burst size.

<mode> The Delay sensitive, Tolerant or Sensitive.

Possible value:

<OLT> 1 to 16 (slot number).

<maxBw> 256 to 1000000, default:100000.

<minBw> 256 to 1000000, default:100000.

<MaxBurst> 1 to 256, default:100.

<mode> 0:Tolerant 1-Sensitive, default:0.

Example:

FK-C16(olt-dba)# set broadcast-sla 6 1000000 1000000 100 1

show broadcast-sla

Syntax:

show broadcast-sla <SLOTs>

Description:

Show broadcast SLA parameters. The details illustrates in session 3-2-6-2.

Argument:

<SLOTs> the target OLT slot(s).

Possible value:

<SLOTs> 1~16; separator character: ",”; range character: "-".

Example:

FK-C16(olt-dba)# show broadcast-sla 6

OLT 6) Broadcast SLA

Max Bw : 1000000 Kbps

Min Bw : 1000000 Kbps

Max Burst : 100 Kbytes

Mode : Sensitive

set aggr-shaper

Syntax:

set aggr-shaper <SLOTs> <direction> <default|<MaxBw> <MaxBurst>>

Description:

Set DBA Aggregate Shaper parameters. If Maximum Allowed Bandwidth or Maximum Allowed Bandwidth is 0, that means disable it. The details illustrates in session 3-2-6-3.

Argument:

<SLOTs> the target OLT slot(s).

<default> default value.

<direction> downstream or upstream.

CENTRAL DE SERVIÇOS AO CLIENTE
0800 412100

<MaxBw> Maximum Allowed Bandwidth.

<MaxBurst> Max Burst size.

Possible value:

<SLOTs> 1~16; separator character: ",”; range character: “-“.

<default> default value , MaxBw = MaxBurst = 0.

<direction> 1-downstream 0-upstream.

<MaxBw> 100 to 1000000, (0 : disable aggregate bandwidth).

<MaxBurst> 0 to 256, (0 : disable aggregate bandwidth).

Example:

FK-C16(olt-dba)# set aggr-shaper 6 1 default

Or

FK-C16(olt-dba)# set aggr-shaper 6 1 100000 256

show aggr-shaper

Syntax:

show aggr-shaper <OLT>

Description:

Show DBA Aggregate Shaper parameters. The details illustrates in session 3-2-6-3.

Argument:

<OLT> a single slot number of the target OLT.

Possible value:

<OLT> 1 to 16 (slot number).

Example:

FK-C16(olt-dba)# show aggr-shaper 6

OLT 6)

Upstream Aggregate Bandwidth

==========

Max Bw : 100000 Kbps

Max Burst : 256 KBytes

Downstream Aggregate Bandwidth

==========

Max Bw : 100000 Kbps

Max Burst : 256 KBytes

CENTRAL DE SERVIÇOS AO CLIENTE
0800 412100

set priority-range

Syntax:

set priority-range <SLOTs> <default|<level 0> <level 1> <level 2>>

Description:

Set DBA Priority Range parameters. <level 0> + <level 1> + <level 2> <= 239. The details illustrates in session 3-2-6-4.

Argument:

<SLOTs> the target OLT slot(s).

<default> default value.

<level 0> Set number of llids in this level.

<level 1> Set number of llids in this level.

<level 2> Set number of llids in this level.

Possible value:

<SLOTs> 1~16; separator character: ",”; range character: "-".

<default> level 0 : 32

level 1 : 128

level 2 : 64

<level 0> 0 to 238.

<level 1> 0 to 238.

<level 2> 1 to 239.

Example:

FK-C16(olt-dba)# set priority-range 6 default

Or

FK-C16(olt-dba)# set priority-range 6 32 128 64

show priority-range

Syntax:

show priority-range <SLOTs>

Description:

Show DBA Priority Range parameters. The details illustrates in session 3-2-6-4.

Argument:

<SLOTs> the target OLT slot(s).

Possible value:

<SLOTs> 1~16; separator character: ",”; range character: "-".

Example:

FK-C16(olt-dba)# show priority-range 6

OLT 6) SLA Priority Range

Number of Level 0 : 32

Number of Level 1 : 128

Number of Level 2 : 64

set polling-rate

Syntax:

set polling-rate <SLOTs> <default|<level 0> <level 1> <level 2>>

Description:

Set DBA Polling Rate parameters. <level 0> + <level 1> + <level 2> <= 239. The details illustrates in session 3-2-6-5.

Argument:

<SLOTs> the target OLT slot(s).

<default> default value.

<level 0> Set the polling rate in this level, the Unit is 65.5us.

<level 1> Set the polling rate in this level, the Unit is 65.5us.

<level 2> Set the polling rate in this level, the Unit is 65.5us.

Possible value:

<SLOTs> 1~16; separator character: ",”; range character: "-".

CENTRAL DE SERVIÇOS AO CLIENTE
0800 412100

<default> level 0 : 15

level 1 : 15

level 2 : 61

<level 0> 0 to 256.

<level 1> 0 to 256.

<level 2> 1 to 256.

Example:

FK-C16(olt-dba)# set polling-rate 6 default

Or

FK-C16(olt-dba)# set polling-rate 6 15 15 61

show polling-rate

Syntax:

show polling-rate <SLOTs>

Description:

Show DBA Polling Rate parameters. The details illustrates in session 3-2-6-5.

Argument:

<SLOTs> the target OLT slot(s).

Possible value:

<SLOTs> 1~16; separator character: ",”; range character: "-".

Example:

FK-C16(olt-dba)# show polling-rate 6

OLT 6) DBA Polling Rate

Level 0 : 16 (65.5 us * 16 = 1048 us)

Level 1 : 16 (65.5 us * 16 = 1048 us)

Level 2 : 61 (65.5 us * 61 = 3995 us)

4-2-3-7 OLT IGMP Proxy

The detail about IGMP is attached on Appendix A Chapter 4.

set param

Syntax:

Set param <OLT> <RC> <RI> <VID> <MQ> <SA-IP> <fc> <ipc>

Description:

Set IGMP proxy parameters. The details illustrates in session 3-2-7-1.

Argument:

<OLT> a single slot number of the target OLT.

<RC> Retransmit Count.

<RI> Retransmit Interval (Unit:10ms).

<VID> VLAN ID.

<MQ> Number of Multicast Queues.

<SA-IP> IPv4 SA.

<fc> IGMP Frame checksum validation, disable or enable.

<ipc> IGMP IP Header checksum validation, disable or enable.

Note: if you want to remove VLAN from IGMP Queries, CoS and VID will be set 0.

CENTRAL DE SERVIÇOS AO CLIENTE
0800 412100

Possible value:

<OLT> 1 to 16 (slot number).

<RC> 0 to 3.

<RI> 1 to 65535.

<VID> 0 to 4094.

<MQ> 1 to 10.

<SA-IP> IPv4 SA.

<fc> 0-disable 1-enable.

<ipc> 0-disable 1-enable.

Example:

FK-C16(olt-igmp)# set param 6 0 1000 0 4 0.0.0.0 0 0

set proxyl

Syntax:

set proxyl <OLT> <LQC> <LQI> <LQR>

Description:

Set the parameters of IGMP Proxy. The parameters are Last Member Query Count, Last Member Query Interval, and Last Member Query Message Max. Response Time. The details illustrates in session 3-2-7-1.

Argument:

<OLT> a single slot number of the target OLT.

<LQC> Last Member Query Count.

<LQI> Last Member Query Interval (Unit:10ms).

<LQR> Last Member Query Message Max. Response Time (Unit:100ms).

Possible value:

<OLT> 1 to 16 (slot number).

<LQC> 0 to 16.

<LQI> 11 to 65535.

<LQR> 1 to 255.

Example:

FK-C16(olt-igmp)# set proxyl 6 2 110 10

set proxyq

Syntax:

Set proxyq <OLT> <MaxG> <RoC> <SQC> <SQI> <QI> <QRT> <QMRT>

Description:

Set the parameters of IGMP Proxy. The details illustrates in session 3-2-7-1.

Argument:

<OLT> a single slot number of the target OLT.

<MaxG> Maximum IGMP Groups.

<RoC> Robustness Count (Unit:10ms).

<SQC> Start Query Count.

<SQI> Start Query Interval (Unit:10ms).

<QI> Query Interval (Unit:10ms).

<QRT> Query Response Timeout (Unit:10ms).

<QMRT> Query Message Maximum Response Time (Unit:100ms).

Possible value:

<OLT> 1 to 16 (slot number).

<MaxG> 0 to 4096. (0=OFF).

<RoC> 1 to 16.

<SQC> 0 to 16.

CENTRAL DE SERVIÇOS AO CLIENTE
0800 412100

<SQI>12 to 65535.

<QI> 12 to 65535.

<QRT> 11 to 65534.

<QMRT> 1 to 255.

Example:

FK-C16(olt-igmp)# set proxyq 6 20 2 2 3125 12500 1001 100

show proxy

Syntax:

show proxy <OLT>

Description:

Show IGMP Proxy. The details illustrates in session 3-2-7-1.

Argument:

<OLT> a single slot number of the target OLT.

Possible value:

<OLT> 1 to 16 (slot number).

Example:

FK-C16(olt-igmp)# show proxy 6

Proxy Configuration

==========

Maximum IGMP Groups : 20

Robustness Count : 2

Query Interval : 12500

Query Response Timeout : 1001

Query Max. Resp. Timeout : 100

Startup Query Count : 2

Startup Query Interval : 3125

Last Query Count : 2

Last Query Interval : 110

Last Query Max. Response Time : 10

Retransmit Count : 0

Retransmit Interval : 1000

VLAN Tag (0=no tag) : 0

Num. Multicast Queues : 4

IPv4 SA : 0.0.0.0

IGMP Frame checksum validation : Disable

IGMP IP Header checksum validation : Disable

set sla

Syntax:

set sla <OLT> <MaxBw> <MinBw> <MaxBurst> <mode>

Description:

Set the SLA of IGMP Proxy. The details illustrates in session 3-2-7-2.

Argument:

<OLT> a single slot number of the target OLT.

<MaxBw> Maximum Allowed Bandwidth.

<MinBw> Minimum Guaranteed Bandwidth.

<MaxBurst> Max Burst Size.

<mode> Priority Level, Tolerant or Sensitive.

CENTRAL DE SERVIÇOS AO CLIENTE
0800 412100

Possible value:

<OLT> 1 to 16 (slot number).

<MaxBw> 256 to 1000000.

<MinBw> 0 to 1000000.

<MaxBurst> 1 to 256.

<mode> 0-Tolerant 1-Sensitive.

Example:

FK-C16(olt-igmp)# set sla 6 100000 100000 100 0

show sla

Syntax:

show sla <OLT>

Description:

Show the SLA of IGMP Proxy. The details illustrates in session 3-2-7-2.

Argument:

<OLT> a single slot number of the target OLT.

Possible value:

<OLT> 1 to 16 (slot number).

Example:

FK-C16(olt-igmp)# show sla 6

Max Bw : 100000 Kbps

Min Bw : 100000 Kbps

Max Burst : 100 KBytes

Mode : Tolerant

set poolsize

Syntax:

set poolsize <OLT> <poolsize>

Description:

Set the SLA of IGMP Proxy. The details illustrates in session 3-2-7-3.

Argument:

<OLT> a single slot number of the target OLT.

<poolsize> FCFS Pool Size (Kbps).

Possible value:

<OLT> 1 to 16 (slot number).

<poolsize> 0 to 1000000.

Example:

FK-C16(olt-igmp)# set poolsize 6 100

add vlan

Syntax:

add vlan <OLT> <NCoS> <NVID> <ECoS> <EVID> <MinBw> <MaxBw> <DBw>

Description:

Add a VLAN group in the IGMP VLAN Provisioning. The details illustrates in session 3-2-7-3.

Argument:

<OLT> a single slot number of the target OLT.

<NcoS> Network CoS.

<NVID> Network VID.

<EcoS> EPON CoS.

<EVID> EPON VID.

<MinBw> Minimum Guaranteed Bandwidth.

<MaxBw> Maximum Allowed Bandwidth.

<DBw> Default Per-Channel Bandwidth.

CENTRAL DE SERVIÇOS AO CLIENTE
0800 412100

Possible value:

<OLT> 1 to 16 (slot number).

<NcoS> 0 to 7.

<NVID> 0 to 4094.

<EcoS> 0 to 7.

<EVID> 0 to 4094.

<MinBw> 0 to 1000000.

<MaxBw> 0 to 1000000.

<DBw> 0 to 1000000.

Example:

FK-C16(olt-igmp)# add vlan 6 0 5 0 10 0 100000 4

del vlan

Syntax:

del vlan <OLT> <num>

Description:

Delete a VLAN group in the IGMP VLAN Provisioning. The details illustrates in session 3-2-7-3.

Argument:

<OLT> a single slot number of the target OLT.

<num> vlan group number.

Possible value:

<OLT> 1 to 16 (slot number).

<num> 1 to 8.

Example:

FK-C16(olt-igmp)# del vlan 6 2

show vlan

Syntax:

show vlan <OLT>

Description:

Show VLAN groups in the IGMP VLAN Provisioning. The details illustrates in session 3-2-7-3.

Argument:

<OLT> a single slot number of the target OLT.

Possible value:

<OLT> 1 to 16 (slot number).

Example:

```
FK-C16(olt-igmp)# show vlan 6

OLT 6 )

FCFS Pool Size          : 100

                                VLAN  1

                             ==========

Network VLAN Tag: CoS                0

Network VLAN Tag: VID                5

EPON VLAN Tag: CoS                   0

EPON VLAN Tag: VID                  10

VLAN Min Guaranteed Bandwidth        0

VLAN Max Allowed Bandwidth      100000

Default Per-Channel BW               4
```


CENTRAL DE SERVIÇOS AO CLIENTE
0800 412100

show group

Syntax:

show group <OLT> <vid>

Description:

Show IGMP group and bandwidth for all groups or per VID. The details illustrates in session 3-2-7-4.

Argument:

<OLT> a single slot number of the target OLT.

<vid> group vid.

Possible value:

<OLT> 1 to 16 (slot number).

<vid> 0 to 4094 (show all groups: 65535).

Example:

FK-C16(olt-igmp)# show group 6 65535

4-2-3-8 OLT Network Parameters

show network

Syntax:

show network <OLT>

Description:

Displays OLT-specific network parameters. These parameters are divided into three portions: OAM Parameters, Ether Type parameter, MPCP parameters. To know the meaning of each parameter,please refer to section 3-2-8.

Argument:

<OLT> a single slot number of the target OLT.

Possible value:

<OLT> 1 to 16 (slot number).

Example:

FK-C16(olt-network)# show network 5

4-2-3-9 OLT Operations

olt-disable

Syntax:

olt-disable <OLT>

Description:

Disables one OLT, turning off the EPON port and blocking both upstream and downstream traffic.

Argument:

<OLT> a single slot number of the target OLT.

Possible value:

<OLT> 1 to 16 (slot number).

Example:

FK-C16(olt)# olt-disable 6

olt-enable

Syntax:

olt-enable <OLT>

Description:

Enable an OLT to pass user traffic.

Argument:

<OLT> a single slot number of the target OLT.

Possible value:

<OLT> 1 to 16 (slot number).

Example:

FK-C16(olt)# olt-enable 6

olt-reboot

Syntax:

olt-reboot <SLOTs>

Description:

CENTRAL DE SERVIÇOS AO CLIENTE
0800 412100

Force an OLT to reboot.

Argument:

<SLOTs> the target OLT slot(s).

Possible value:

<SLOTs> 1~16; separator character: ",”; range character: "-".

Example:

FK-C16(olt)# olt-reboot 6

olt-restore

Syntax:

olt-restore <OLT>

Description:

Erase all provisioning records of Non-Volatile Store (NVS) and reboot the OLT. This operation returns the operator provisioning database to default values.

It includes OLT Traffic Management, OLT Advanced Bridging Config, OLT DBA(Drop Down Weights, Priority Range, Polling Rate, Aggregate Shaper, Broadcast SLA), OLT IGMP Proxy, All Logical Link Bridge Mode, SLA, Multicast SLA).

Argument:

<OLT> a single slot number of the target OLT.

Possible value:

<OLT> 1 to 16 (slot number).

Example:

FK-C16(olt)# olt-restore 6

4-2-3-10 Advanced Bridging Config : General Setting

show advbrdgcfg

Syntax:

show advbrdgcfg <OLT>

Description:

Show advanced bridge config.

Argument:

<OLT> a single slot number of the target OLT.

Possible value:

<OLT> 1 to 16 (slot number).

Example:

FK-C16(link-bm)# show advbrdgcfg 6

set advbrdgcfg

Syntax:

set advbrdgcfg <OLT> <age> <vlan #> <reset> <overwrite> <discard> <allow>

Description:

Set advanced bridge config.

Argument:

<OLT> a single slot number of the target OLT.

<age> learned entry age limit(0~32768).

<vlan #> number of bridged vlans, default 24.

<reset> downstream frames reset age, 0-disable 1-enable.

<overwrite> mac learing overwrite, 0-disable 1-enable.

<discard> discard unknown mac, 0-disable 1-enable.

<allow> allow vlan tags on simple bridge, 0-disable 1-enable.

CENTRAL DE SERVIÇOS AO CLIENTE
0800 412100

Possible value:

<OLT> 1 to 16 (slot number).

<age> 0 to 32768.

<vlan #> 0 to 24.

<reset> 0, 1.

<overwrite> 0, 1.

<discard> 0, 1.

<allow> 0, 1.

Example:

FK-C16(link-bm)# set advbrdgcfg 6 0 24 0 0 0 1

Advanced Bridging Config : Priority Copy Config

show pricopycfg

Syntax:

show pricopycfg <OLT>

Description:

Show priority copy config of an OLT.

Argument:

<OLT> a single slot number of the target OLT.

Possible value:

<OLT> 1 to 16 (slot number).

Example:

FK-C16(link-bm)# show pricopycfg 6

set pricopycfg

Syntax:

set pricopycfg <OLT> <A/B Precedence> <Default output COS value>

Description:

Set priority copy config for an OLT.

Argument:

<OLT> a single slot number of the target OLT.

<A/B Precedence> Priority Mode A or Mode B is selected what priority field to lookup in the input frame. 0 = Mode A only, 1 = Mode B only, 2 = Mode A over B, 3 = Mode B over A

<Default output COS value> Default output COS value when there is no priority

Possible value:

<OLT> 1 to 16 (slot number).

<slotid> 1 to 16.

<A/B Precedence> 0 to 3

<Default output COS value> 0 to 7

Example:

FK-C16(link-bm)# set pricopycfg 6 2 7

set pricopytable

Syntax:

set pricopytable <OLT> <priotity table> <Number of entries> <output cos mapping 0,1,2,..N-1>

Description:

Set priority copy table for an OLT.

Argument:

<OLT> a single slot number of the target OLT.

<priority table> a -> priority mode A table , b -> priority mode B table.

<Number of entries> N, Number of entries for priority mode A(B) table.

<output cos mapping 0..N-1> Output COS value, when input priority value is 0..N-1 ,comma separate.

CENTRAL DE SERVIÇOS AO CLIENTE
0800 412100

Possible value:

<OLT> 1 to 16 (slot number).

<priority table> a, b.

<Number of entries> 0 to 8.

<output cos mapping 0..N-1> 0 to 7.

Example:

FK-C16(link-bm)# set pricopytable 6 b 8 0,1,2,3,4,5,6,7

4-2-3-11 ONU Authorization

onu-auth

Syntax:

show onu-auth <OLT>

Description:

Show onu authorization. It includes authorized/unauthorized ONUs under an OLT.

Argument:

<OLT> a single slot number of the target OLT.

Possible value:

<OLT> 1 to 16 (slot number).

Example:

FK-C16(onu-auth)# show onu-auth 6

add-onu

Syntax:

add-onu <OLT> <ONU> <linknum> [<profile>]

Description:

Add one ONU to authorization list. When a new onu will be put into epon system, you can add the onu mac address to authorization list and operate the onu.

Argument:

<OLT> a single slot number of the target OLT.

<ONU> the target ONU.

<linknum> link number.

Possible value:

<OLT> 1 to 16 (slot number).

<ONU> onuMAC or onuAlias.

<linknum> 1 ~ 8.

Example:

FK-C16(onu-auth)#add-onu 6 00-40-c7-48-01-20 3

FK-C16(onu-auth)# show onu-auth 6

Idx	ONU-MAC	Link #	Status	Mark	Authorized	Profile
1	00-40-c7-48-01-20	3		*	Yes	
2	00-40-c7-49-01-30	2	Registered		Yes	
3	00-40-c7-49-01-60	6			Yes	

Authorize will check Link # and ONU Link number. If conflict, Mark field will be *.

del-onu

Syntax:

del-onu <OLT> <index>

Description:

Del one ONU from management list. When a onu has be removed from epon system, you can delete the onu mac address from ONU authorization list.

CENTRAL DE SERVIÇOS AO CLIENTE
0800 412100

Argument:

<OLT> a single slot number of the target OLT.

<index> the index of the onu-auth. e.g. 2,5-7,9,11. Before del-onus , you must first show onu-auth.

Possible value:

<OLT> 1 to 16 (slot number).

<index> 1 to 32 (ONU index); separator character: ",”; range character: "-".

Example:

FK-C16(onu-auth)#del-onu 6 1,2

authorize

Syntax:

authorize <OLT> <index>

Description:

Set onu authorize. After ONU is authorized, ONU can have service. All ONU want to have bandwidth and you must let ONU be authorized first.

Argument:

<OLT> a single slot number of the target OLT.

<index> the index of the onu-auth. e.g. 2,5-7,9,11. Before authorize , you must first show onu-auth.

Possible value:

<OLT> 1 to 16 (slot number).

<index> 1 to 32 (ONU index); separator character: ",”; range character: "-".

Example:

FK-C16(onu-auth)# authorize 6 1,2

FK-C16(onu-auth)# show onu-auth 6

Idx	ONU-MAC	Link #	Status	Mark	Authorized	Profile
1	00-40-c7-48-01-20	3		*	Yes	
2	00-40-c7-49-01-30	2	Registered		Yes	

3 00-40-c7-49-01-60 6 No

onu-profile

Syntax:

set onu-profile <OLT> <ONU> <profile>

Description:

Set onu profile. The onu config can be imported by setting onu profile. The profile file must be exported by export-onu command before. You set onu profile file and then do-import command.

Argument:

<OLT> a single slot number of the target OLT.

<ONU> the target ONU.

<profile> ONU's profile name.

Possible value:

<OLT> 1 to 16 (slot number).

<ONU> onuMAC or onuAlias.

<profile> file name of ONU's profile (.prf file extension).

Example:

FK-C16(onu-auth)# set onu-profile 6 00-40-c7-48-01-20 3llid.prf

FK-C16(onu-auth)# show onu-auth 6

Idx	ONU-MAC	Link #	Status	Mark	Authorized	Profile
1	00-40-c7-48-01-20	3		*	Yes	3llid.prf
2	00-40-c7-49-01-30	2	Registered		Yes	
3	00-40-c7-49-01-60	6			No	

unauthorize

Syntax:

unauthorize <OLT> <index>

CENTRAL DE SERVIÇOS AO CLIENTE
0800 412100

Description:

Unauthorize ONUs in the OLT.The unauthorized ONU will have no bandwidth.

Argument:

<OLT> a single slot number of the target OLT.

<index> the index of the onu-auth. e.g. 2,5-7,9,11. Before unauthorize, you must first show onu-auth.ONU's.

Possible value:

<OLT> 1 to 16 (slot number).

<index> 1 to 32 (ONU index); separator character: ",”; range character: "-".

Example:

FK-C16(onu-auth)# unauthorize 6 1,2

FK-C16(onu-auth)# show onu-auth 6

Idx	ONU-MAC	Link #	Status	Mark	Authorized	Profile
1	00-40-c7-48-01-20	3		*	No	3llid.prf
2	00-40-c7-49-01-30	2	Registered		No	
3	00-40-c7-49-01-60	6			No	

4-2-3-12 ONU Preprovision

show onu preprov

Syntax:

show onu-preprov <OLT>

Description:

Show onu preprovision. It includes preprovisioned ONUs under an OLT.

Argument:

<OLT> a single slot number of the target OLT.

Possible value:

<OLT> 1 to 16 (slot number).

Example:

FK-C16(onu-preprov)# show onu-preprov 6

index	auth	mac	link #	status	profile
1		00-40-c7-49-01-30	2	Registered	
2		00-40-c7-49-03-98	2	Registered	

add-list

Syntax:

add-list <OLT> <index>

Description:

Add one ONU to authorization list.

Argument:

<OLT> a single slot number of the target OLT.

<index> the index of the onu-preprov. e.g. 2,5-7,9,11. Before add-list, you must first show onu- preprov.

CENTRAL DE SERVIÇOS AO CLIENTE
0800 412100

Possible value:

<OLT> 1 to 16 (slot number).

<index> 1 to 32 (ONU index); separator character: ",”; range character: "-".

Example:

FK-C16(onu-preprov)# add-list 6 1,2

create-onu

Syntax:

create-onu <OLT> <ONU> <linknum>

Description:

Create ONU for ONU preprovision.

Argument:

<OLT> a single slot number of the target OLT.

<ONU> the target ONU.

<linknum> link number.

Possible value:

<OLT> 1 to 16 (slot number).

<ONU> onuMAC or onuAlias.

<linknum> 1~8

Example:

```
FK-C16(onu-preprov)# show onu-preprov 6
index   auth   mac                 link #   status          profile
=====  ====  ================  ======  ===========  ================
1       *      00-40-c7-49-01-30     2       Registered
2       *      00-40-c7-49-03-98     2       Registered
FK-C16(onu-preprov)# create-onu 6 00-40-c7-48-01-20 3
FK-C16(onu-preprov)# show onu-preprov 6
index   auth   mac                 link #   status          profile
```

```
===== ==== ================ ====== =========== =================
1             00-40-c7-48-01-20      3
2       *     00-40-c7-49-01-30      2          Registered
3       *     00-40-c7-49-03-98      2          Registered
```

del-onu

Syntax:

del-onu <OLT> <index>

Description:

Delete many ONUs from ONU preprovision.

Argument:

<OLT> a single slot number of the target OLT.

<index > the index of the onu-preprov. e.g. 2,5-7,9,11. Before del-onu , you must first show onu-preprov.

Possible value:

<OLT> 1 to 16 (slot number).

<index> 1 to 32 (ONU index); separator character: ",; range character: "-".

Example:

```
FK-C16(onu-preprov)# show onu-preprov 6
index   auth   mac                  link #    status           profile
===== ==== ================ ====== =========== =================
1             00-40-c7-48-01-20      3
2       *     00-40-c7-49-01-30      2          Registered
3       *     00-40-c7-49-03-98      2          Registered
FK-C16(onu-preprov)# del-onu 6 1
FK-C16(onu-preprov)# show onu-preprov 6
index   auth   mac                  link #    status           profile
===== ==== ================ ====== =========== =================
```


CENTRAL DE SERVIÇOS AO CLIENTE
0800 412100

1	*	00-40-c7-49-01-30	2	Registered
2	*	00-40-c7-49-03-98	2	Registered

do-import

Syntax:

do-import <OLT> <index|ONU> <profile>

Description:

Import ONU Profile. The onu config can be imported by setting onu profile. The profile file must be exported by export-onu command before. You set onu profile and then do-import command. If you want to do-import, you must let OLT connect with ONU first.

Argument:

<OLT> a single slot number of the target OLT.

<index> the index of the onu-preprov. e.g. 2,5-7,9,11.

<ONU> the target ONU.

<profile> ONU's profile name.

Possible value:

<OLT> 1 to 16 (slot number).

<index> 1 to 32 (ONU index); separator character: ",”; range character: “-“.

<ONU> onuMAC or onuAlias.

<profile> file name of ONU's profile (.prf file extension).

Example:

FK-C16(onu-preprov)# do-import 6 1,2 newprofile.prf

bm

Syntax:

bm

Description:

ONU Preprovision bridge mode.

Argument:

None.

Possible value:
None.

Example:
FK-C16(onu-preprov)# bm

Go to bridge mode command mode.

FK-C16(onu-preprov-bm)#

sla

Syntax:
sla

Description:
ONU Preprovision sla mode.

Argument:
None.

Possible value:
None.

Example:
FK-C16(onu-preprov)# sla

Go to sla command mode.

FK-C16(onu-preprov-sla)#

4-2-3-13 OLT Redundant

show redund-config

Syntax:
show redund-config

Description:
Show OLT Redundant config. One OLT is set to be master OLT, another is set to be slave OLT. When the master OLT is broken or can't be connected with ONUs by using fiber line. The slave OLT will take over master OLT, and the line between the master OLT and the ONUs will be disconnected. The slave OLT will be connected with ONUs.

CENTRAL DE SERVIÇOS AO CLIENTE
0800 412100

Argument:

None.

Possible value:

None.

Example:

FK-C16(olt-redundant)# show redund-config

Group No	Status	Master	Slave	Auto change	Dual-write
1	Enable	6	11	On	On
2	Disable	0	0	Off	Off
3	Disable	0	0	Off	Off
4	Disable	0	0	Off	Off
5	Disable	0	0	Off	Off
6	Disable	0	0	Off	Off
7	Disable	0	0	Off	Off
8	Disable	0	0	Off	Off

show redund-status

Syntax:

show redund-status

Description:

Show OLT Redundant status.

Argument:

None.

Possible value:

None.

Example:

FK-C16(olt-redundant)# show redund-status

```
Slot    Model Name       Group  State
====  ============  =====  =====
1
2
3
4
5       OLT-E100                  On
-------------------------------------------------
6
7       OLT-TE01                  On
8
9       OLT-TE01                  On
10
-------------------------------------------------
11      OLT-E100                  On
12      OLT-TE01                  On
13
14      OLT-TE01                  On
15
-----------------------------------------------
16
```

clear redundant

Syntax:

clear redundant <group #>

Description:

CENTRAL DE SERVIÇOS AO CLIENTE
0800 412100

Clear OLT Redundant group entry.

Argument:

<group # > group number 1~8.

Possible value:

<group # > 1~8.

Example:

FK-C16(olt-redundant)# clear redundant 1

set redundant

Syntax:

set redundant <group #> <master OLT> <slave OLT>

Description:

Set OLT Redundant.

Argument:

<group # > group number 1~8.

<master OLT> working OLT.

<slave OLT> redundant working OLT.

Possible value:

<group # > 1~8.

<master OLT> 1~16.

<slave OLT> 1~16.

Example:

FK-C16(olt-redundant)# set redundant 1 6 11

After Set OLT redundant, you must remember to sync OLT.

sync-olt

Syntax:

sync-olt <group #>

Description:

Synchronize OLT config.

Argument:

<group # > group number 1~8.

Possible value:

<group # > 1~8.

Example:

FK-C16(olt-redundant)# sync-olt 1

disable redundant

Syntax:

disable redundant <group #>

Description:

Disable OLT Redundant.

Argument:

<group # > group number 1~8.

Possible value:

<group # > 1~8.

Example:

FK-C16(olt-redundant)# disable redundant 1

FK-C16(olt-redundant)# show redund-config

Group No	Status	Master	Slave	Auto change	Dual-write
1	Disable	6	11	On	On
2	Disable	0	0	Off	Off
3	Disable	0	0	Off	Off
4	Disable	0	0	Off	Off
5	Disable	0	0	Off	Off
6	Disable	0	0	Off	Off

CENTRAL DE SERVIÇOS AO CLIENTE
0800 412100

7	Disable	0	0	Off	Off
8	Disable	0	0	Off	Off

enable redundant

Syntax:

enable redundant <group #>

Description:

Enable OLT Redundant.

Argument:

<group # > group number 1~8.

Possible value:

<group # > 1~8.

Example:

FK-C16(olt-redundant)# enable redundant 1

set auto-change

Syntax:

set auto-change <group #> <value>

Description:

Auto change OLT redundant if OLT fail. If Auto Change on, the master OLT and the slave OLT switch is automatically changed. If Auto Change off, the master OLT and the slave OLT switch is not automatically changed.

Argument:

<group # > group number 1~8.

<value > 1-on , 0-off.

Possible value:

<group # > 1~8.

<value > 0, 1.

Example:

FK-C16(olt-redundant)# set auto-change 1 0 (set group 1 automatic change off)

FK-C16(olt-redundant)# show redund-config

Group No	Status	Master	Slave	Auto change	Dual-write
1	Enable	6	11	Off	On
2	Disable	0	0	Off	Off
3	Disable	0	0	Off	Off
4	Disable	0	0	Off	Off
5	Disable	0	0	Off	Off
6	Disable	0	0	Off	Off
7	Disable	0	0	Off	Off
8	Disable	0	0	Off	Off

set dual-write

Syntax:

set dual-write <group #> <value>

Description:

Set OLT Dual Write. If Dual Write on, you set commands to ONU by way of the master OLT and at the same time the slave OLT is set also. If Dual Write off, you set commands to ONU only by way of master OLT. The slave OLT is not be set.

Argument:

<group # > group number 1~8.

<value > 1-on , 0-off.

CENTRAL DE SERVIÇOS AO CLIENTE
0800 412100

Possible value:

<group # > 1~8.

<value > 0, 1.

Example:

FK-C16(olt-redundant)# set dual-write 1 0 (set group 1 dual write off)

set olt-onoff

Syntax:

set olt-onoff <OLT> <state>

Description:

Open/Close OLT epon port. If you want to set OLT epon port on or off.you can set olt-onoff command.

Argument:

<OLT> a single slot number of the target OLT.

<state > 1-on , 0-off.

Possible value:

<OLT> 1 to 16 (slot number).

<state > 0, 1.

Example:

FK-C16(olt-redundant)# set olt-onoff 6 0

FK-C16(olt-redundant)# show redund-status

Slot Model Name Group State

==== ============ ===== =====

1

2

3

4

5 OLT-E100 On

---

6 OLT-E100 Off

7 OLT-TE01 On

8

9 OLT-TE01 On

10

---

11 OLT-E100 On

12 OLT-TE01 On

13

14 OLT-TE01 On

15

16

FK-C16(olt-redundant)# set olt-onoff 6 1

FK-C16(olt-redundant)# show redund-status

Slot Model Name Group State

==== ============ ===== =====

1

2

3

4

5 OLT-E100 On

---

6 OLT-E100 On

7 OLT-TE01 On

CENTRAL DE SERVIÇOS AO CLIENTE
0800 412100

```
8
9    OLT-TE01                    On
10
-------------------------------------------------
11   OLT-E100                     On
12   OLT-TE01                    On
13
14   OLT-TE01                    On
15
-------------------------------------------------
16
```

switch-olt

Syntax:

switch-olt <group #>

Description:

Switch OLT config. If you want to change master-OLT to slave-OLT and slave-OLT to master-OLT. You set switch-olt command.

Argument:

<group # > group number 1~8.

Possible value:

<group # > 1~8.

Example:

```
FK-C16(olt-redundant)# show redund-status
Slot    Model Name      Group   State
====  ============  =====  =====
1
2
3
4
5    OLT-E100                    On
-------------------------------------------------------------
6    OLT-TE01           1        On
7
8
9    OLT-TE01                    On
10
-------------------------------------------------------------
11    OLT-E100          1       Off
12    OLT-TE01                  On
13
14    OLT-TE01                 On
15
-------------------------------------------------------------
16
```


CENTRAL DE SERVIÇOS AO CLIENTE
0800 412100

```
FK-C16(olt-redundant)# switch-olt 1

FK-C16(olt-redundant)# show redund-status
Slot    Model Name       Group  State
====  ============  =====  =====
1
2
3
4
5    OLT-E100                    On
-----------------------------------------------------
6    OLT-TE01            1       Off
7
8
9    OLT-TE01                    On
10
-----------------------------------------------------
11    OLT-E100            1       On
12    OLT-TE01                  On
13
14    OLT-TE01                  On
15
-----------------------------------------------------
16
```

set register-onu

Syntax:

set register-onu <OLT #1> <OLT #2>

Description:

Set Registered ONU slot field to new value. It is used for ONU Subscriber Information.

Argument:

<OLT #1> a single slot number. You want to change from OLT #1 to OLT #2.

<OLT #2> a single slot number that is changed to OLT #2.

Possible value:

<OLT #1> 1~16.

<OLT #2> 1~16.

Example:

FK-C16(olt-redundant)# onuname

slot : 6

alias name : nankang1

mac address : 00-40-c7-49-01-30

location :

telephone :

contact :

description :

FK-C16(olt-redundant)# set register-onu 6 11

FK-C16(olt-redundant)# onuname

slot : 11

alias name : nankang1

CENTRAL DE SERVIÇOS AO CLIENTE
0800 412100

mac address : 00-40-c7-49-01-30

location :

telephone :

contact :

description :

---

show reboot

Syntax:

Show reboot

Description:

Show olt reboot time setting.

Argument:

None.

Possible value:

None.

Example:

FK-C16(olt-reboot)# show reboot

set reboot-time

Syntax:

set reboot-time <YYYY/MM/DD> <hh:mm>

Description:

Set olt reboot time. It includes year, month, day, hour and minute.

Argument/Possible Value:

<YYYY/MM/DD> YYYY means year, MM means month, DD means day.

<hh:mm> hh means hour, mm means minute.

Example:

FK-C16(olt-reboot)# set reboot-time 2008/10/21 13:10

set reboot-olt

Syntax:

set reboot-olt <range> <state> [<onu reboot>]

Description:

Set olt reboot olt.

Argument/Possible Value:

<range> 1,5-7, available from 1 to 16.

<state>1- yes, 0- no.

<onu reboot> If OLT reboot. ONUs connected with the OLT also reboot ,1-yes , 0-no.

Example:

FK-C16(olt-reboot)# set reboot-olt 3-5,9 1

OLT Reboot Time Setting

year : 2008

month : 10

day : 21

hour : 13

minute : 10

CENTRAL DE SERVIÇOS AO CLIENTE
0800 412100

If OLT reboot. ONUs connected with the OLT also reboot. : No

Slot 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16

==========

V V V V

4-2-3-14 ONU Subscriber View

show onuname

Syntax:

show onuname <page>

Description:

Show onu name by page.

Argument:

<page> show onu onuname by page. one page is 64 entry. page 0 : show all entry.

Possible value:

<page> 0 ~ 8.

Example:

FK-C16(onu-si)# show onuname 1

set onuname

Syntax:

set onuname <onuMAC> <OLT> <name>

Description:

Set onu alias name.

Argument:

<onuMAC> ONU MAC address.

<OLT> a single slot number of the target OLT.

<name> ONU alias name.

Possible value:

<OLT> 1 to 16 (slot number).

<name> A string must be at most 23 characters.

Example:

FK-C16(onu-si)# set onuname 00-40-C7-49-01-30 6 nankang1

del onuname

Syntax:

del onuname <name>

Description:

Del onu name.

Argument:

<name> ONU alias name.

Possible value:

<name> A string must be at most 23 characters.

Example:

FK-C16(onu-si)# del onuname nankang1

set onu-contact

Syntax:

set onu-contact <onuMAC|onuAlias > <contact>

Description:

Set onu contact.

Argument:

<onuMAC|onuAlias > ONU MAC address or ONU alias.

<contact> ONU contact.

CENTRAL DE SERVIÇOS AO CLIENTE
0800 412100

Possible value:

<onuAlias> A string must be at most 23 characters.

<contact> A string must be at most 23 characters.

Example:

FK-C16(onu-si)# set onu-contact nankang1 jack

set onu-description

Syntax:

set onu-description <onuMAC|onuAlias> <description>

Description:

Set onu description

Argument:

<onuMAC|onuAlias > ONU MAC address or ONU alias

<description> ONU description

Possible value:

<onuAlias> A string must be at most 23 characters.

<description> A string must be at most 47 characters.

Example:

FK-C16(onu-si)# set onu-description nankang1 "set up 2006/12/21"

set onu-location

Syntax:

show onu-location <onuMAC|onuAlias> <location>

Description:

Set onu contact.

Argument:

<onuMAC|onuAlias > ONU MAC address or ONU alias

<onuAlias> ONU alias name

<location> ONU location

Possible value:

<onuAlias> A string must be at most 23 characters.

<location> A string must be at most 47 characters.

Example:

FK-C16(onu-si)# set onu-location nankang1 taipei

set onu-telephone

Syntax:

show onu-telephone <onuMAC|onuAlias> <telephone >

Description:

Set onu telephone.

Argument:

<onuMAC|onuAlias > ONU MAC address or ONU alias

<telephone> ONU telephone number, max length is 23

Possible value:

<onuAlias> A string must be at most 23 characters.

<telephone > A string must be at most 47 characters.

Example:

FK-C16(onu-si)# set onu-telephone nankang1 02-27853961

CENTRAL DE SERVIÇOS AO CLIENTE
0800 412100

4-2-3-15 ONU List and Onu Port Config

show onus

Syntax:

show onus <OLT>

Description:

The command displays a table containing status information of all registered ONUs under the OLT slot specified.The status information comprises two parts.

The first part is the UNI port status information.The second part (in the right corner of the output display) includes [Model Name], [Mac Address], [Alias Name], [Logical Links ->Active Links/Number of All Links].

Argument:

<OLT> a single slot number of the target OLT.

Possible value:

<OLT> 1 to 16 (slot number).

Example:

FK-C16(onu)# show onus 6

set-port state

Syntax:

set-port state <OLT> <ONU> <port> <enable|disable>

Description:

Configuring the management status of a UNI port on an ONU.

Argument:

<OLT> the slot number of the OLT that connects with the target ONU.

<ONU> The MAC Address or Alias Name (User Name) to identify the target ONU.

<port> the target port number.

Possible value:

<OLT> 1 to 16 (slot number).

<port> 1 -> UNI Port 1; 2 -> UNI Port 2.

Example:

FK-C16(onu)# set-port state 6 00-40-c7-ff-ff-08 1 disable

FK-C16(onu)# set-port state 6 onualias 1 enable

set-port speed-duplex

Syntax:

set-port speed <OLT> <ONU> <port> <auto>|[<10|100|1000> <half|full>]

Description:

Configuring line speed of the UNI port on an ONU.

Argument:

<OLT> the slot number of the OLT that connects with the target ONU.

<ONU> the target ONU.

<port> the target port number.

Possible value:

<OLT> 1 to 16 (slot number).

<ONU> The Mac Address or Alias Name (User Name) to identify the target ONU.

<port> 1 -> UNI Port 1; 2 -> UNI Port 2.

<10|100|1000> 10 -> 10 Mbps; 100 -> 100 Mbps; 1000 -> 1000Mbps.

Example:

FK-C16(onu)# set-port speed-duplex 6 00-40-c7-ff-ff-08 1 auto

FK-C16(onu)# set-port speed-duplex 6 onualias 2 100 full

FK-C16(onu)# set-port speed-duplex 6 onualias 1 1000 full

set-port flow-control

Syntax:

set-port flow-control <OLT> <ONU> <port> <enable|disable>

CENTRAL DE SERVIÇOS AO CLIENTE
0800 412100

Description:

Configuring flow control state of the UNI port on an ONU.

Argument:

<OLT> the slot number of the OLT that connects with the target ONU.

<ONU> the target ONU.

<port> the target port number.

Possible value:

<OLT> 1 to 16 (slot number).

<ONU> The Mac Address or Alias Name (User Name) to identify the target ONU.

<port> 1 -> UNI Port 1; 2 -> UNI Port 2.

Example:

FK-C16(onu)# set-port flow-control 6 00-40-c7-ff-ff-08 1 enable

FK-C16(onu)# set-port flow-control 6 onualias 1 disable

4-2-3-16 ONU Statistics

show port-statistics

Syntax:

show port-statistics <OLT> <ONU> <port> <direction>

Description:

To show statistics related to the specified port.

Argument:

<OLT> the slot number of the OLT that connects with the target ONU.

<ONU> the target ONU.

<port> 0-EPON port, 1-ONU User Port 1, 2-ONU User Port 2.

<direction> 0-upstream 1-downstream.

Possible value:

<OLT> 1 to 16 (slot number).

<ONU> The Mac Address or Alias Name (User Name) to identify the target ONU.

<port> 0 to 2.

<direction> 0, 1.

Example:

FK-C16(onu-sta)# show port-statistic 6 nankang1 0 0

clear onu-counter

Syntax:

clear onu-counter <OLT> <ONU>

Description:

Clear all ONU counter.

Argument:

<OLT> the slot number of the OLT that connects with the target ONU.

<ONU> the target ONU.

Possible value:

<OLT> 1 to 16 (slot number).

<ONU> The Mac Address or Alias Name (User Name) to identify the target ONU.

Example:

FK-C16(olt-sta)# clear onu-counter 6 nankang1 or

FK-C16(olt-sta)# clear onu-counter 6 00-40-c7-49-01-30

CENTRAL DE SERVIÇOS AO CLIENTE
0800 412100

4-2-3-17 ONU Information

show onuInfo

Syntax:

show onuInfo <OLT> <ONU>

Description:

Displays detailed description about the specified ONU.

Argument:

<OLT> the slot number of the OLT that connects with the target ONU.

<ONU> the target ONU.

Possible value:

<OLT> 1 to 16 (slot number).

<ONU> The Mac Address or Alias Name (User Name) to identify the target ONU.

Example:

FK-C16(onu)# show onuInfo 6 00-40-c7-ff-ff-08

FK-C16(onu)# show onuInfo 6 onualias

4-2-3-18 ONU Traffic Management

The concept about Rule Setting is attached on Appendix A Chapter 1.

Rules Setting

set target-onu

Syntax:

set target-onu <OLT> <ONU>.

Description:

Set target onu. After setting the current working onu , you will set rule to the onu.

Argument:

<OLT> the slot number of the OLT that connects with the target ONU.

<ONU> the target ONU.

Possible value:

<OLT> 1 to 16 (slot number).

<ONU> The Mac Address or Alias Name (User Name) to identify the target ONU.

Example:

FK-C16(onu-tm)# set target-onu 6 nankang1 or

FK-C16(onu-tm)# set target-onu 6 00-40-c7-49-01-30

show target-onu

Syntax:

show target-onu

Description:

Show target onu. The target onu is the current working onu that you can set rule.

Argument:

None.

Possible value:

None.

Example:

FK-C16(onu-tm)# show target-onu

showtmp clause

Syntax:

showtmp clause [<clause no>]

Description:

Show onu clause templates.

CENTRAL DE SERVIÇOS AO CLIENTE
0800 412100

Argument:

<clause no> clause template index, available from 0 to 19.

Possible value:

<clause no> 0 to 19.

Example:

FK-C16(onu-tm)# showtmp clause 0

editmp clause

Syntax:

editmp clause <clause no> <direction> <field selects value> <op> <type> <value>

Description:

Edit onu clause template.

Argument:

<clause no> clause template index, available from 0 to 19.

<direction> 1-upstream, 0-downstream.

<field selects value> (using "hint clause" value).

<op> operator.

<value> operation value, 6 bytes value.

Possible value:

<clause no> 0 to 19.

<direction> 0, 1.

<field selects value> 0 to 10.

<op> 0 to 7. 0: Fail, 1: ==, 2: !=, 3: <=, 4: >=, 5: exists, 6: !exist, 7: True.

<type> value type , 0:Hex , 1:Decimal , 2:IP format, a:automatic. When field is User, can't select type automatically.

<value> 6 byte hex value.

Example:

FK-C16(onu-tm)# editmp clause 0 0 3 1 a 001122334455

hint clause

Syntax:

hint clause

Description:

Hint onu clause.

Argument:

None.

Possible value:

None.

Example:

FK-C16(onu-tm)# hint clause

showtmp action

Syntax:

showtmp action <action no>

Description:

Show onu action template.

Argument:

<action no> action template index.

Possible value:

<action no> 0 to 19.

Example:

FK-C16(onu-tm)# showtmp action 0

CENTRAL DE SERVIÇOS AO CLIENTE
0800 412100

editmp action

Syntax:

editmp action <action no> <action> <action param 1> <action param 2>

Description:

Edit action template.

Argument:

<action no> action template index, available from 0 to 19.

<action> action value (using "hint action" value).

<action param 1> action needed parameter.

<action param 2> action needed parameter.

Possible value:

<action no > 0 to 19.

<action value> 0 to 29.

Example:

FK-C16(onu-tm)# editmp action 0 18 1 0

FK-C16(onu-tm)# editmp action 1 22 5

FK-C16(onu-tm)# editmp action 2 21 100

hint action

Syntax:

hint action

Description:

Hint action.

Argument:

None.

Possible value:

None.

Example:

FK-C16(onu-tm)# hint action

showtmp rule

Syntax:

showtmp rule <rule no>

Description:

Show onu rule template.

Argument:

<rule no> rule template index, available from 0 to 19.

Possible value:

<rule no> 0 to 19.

Example:

FK-C16(onu-tm)# showtmp rule 0

editmp rule

Syntax:

editmp rule <rule no> <priority(8-13)> <action no)> <clause no> <clause no> ..

Description:

Edit rule template.

Argument:

<rule no> rule template no, available from 0 to 19.

<priority> rule template rule priority(8~13).

<action no> action template index, available from 0 to 19.

<clause no> clause template index, available from 0 to 19.

CENTRAL DE SERVIÇOS AO CLIENTE
0800 412100

Possible value:

<rule no> 0 to 19.

<action no > 0 to 19.

<clause no> 0 to 19.

Example:

FK-C16(onu-tm)# editmp rule 0 12 0 0

apply rule

Syntax:

apply rule <rule no> <source port>

Description:

Apply rule template.

Argument:

<rule no> rule template no.

<source port> ONU port, 0-EPON port(downstream), 1-ONU User Port 1, 2-ONU User Port 2(upstream).

Possible value:

<rule no> 0 to 19.

<source port > 0 to 2.

Example:

FK-C16(onu-tm)# apply rule 0 0

show rule

Syntax:

show rule <OLT> <ONU> <port>

Description:

Show onu rule table.

Argument:

<OLT> the slot number of the OLT that connects with the target ONU.

<ONU> the target ONU.

<port> ONU port no.

Possible value:

<OLT> 1 to 16 (slot number).

<ONU> The Mac Address or Alias Name (User Name) to identify the target ONU.

<port> 0-EPON port, 1-ONU User Port 1, 2-ONU User Port 2.

Example:

FK-C16(onu-tm)# show rule 6 onu001 2

del rule

Syntax:

del rule <OLT> <ONU> <port> <no>

Description:

Del onu rule table.

Argument:

<OLT> the slot number of the OLT that connects with the target ONU.

<ONU> the target ONU.

<port> ONU port no.

<no> rule no,. greater than 0.

Possible value:

<OLT> 1 to 16 (slot number).

<ONU> The Mac Address or Alias Name (User Name) to identify the target ONU.

<port> 0-EPON port, 1-ONU User Port 1, 2-ONU User Port 2.

<no> 1, 2 to (ONU rule number).

Example:

FK-C16(onu-tm)# del rule 6 onu003 1

CENTRAL DE SERVIÇOS AO CLIENTE
0800 412100

When you want to set up a onu rule, you must follow below steps:

Step 1. hint clause(in order to see the value that you want to match)

step 2. editmp clause(edit a clause template)

step 3. editmp action(edit a action template)

step 4. editmp rule(edit a rule template)

step 5. apply rule

Note: Upstream clauses only apply to onu port 1,2. Downstream clauses only apply to onu epon port.

Example:

```
FK-C16(onu-tm)# showtmp action 0
        action no       : 0
        action          : Set Destination; Forward
        param           : link-index/port-no = 1 ; queue-index = 0

FK-C16(onu-tm)# showtmp clause 2
        no dir          field-select      op      type     value
        == ========== ============ ====== ====== ==================
        2  downstream  L2 Source Addr  ==      Hex     0x0000000000334455

        FK-C16(onu-tm)# editmp rule 1 12 0 2
        FK-C16(onu-tm)# showtmp rule 1
        rule template no  : 1
        direction         : downstream
        priority          : 12
        action            : Set Destination; Forward
        param             : port-no = 1 ; queue-index = 0
        field-select       : L2 Source Addr
        operation         : ==
        value             : 0x0000000000334455
```

The above example is a downstream rule. It means that when L2 SA equal 0x000000334455 forward to onu port 1 queue index 0. It can't apply to port 1 and port 2.

```
FK-C16(onu-tm)# apply rule 1 0
```

Queue Configuration

showtmp queue

Syntax:

showtmp queue <tmpno>

Description:

Show onu queue template.

Argument:

<tmpno> queue template no.

Possible value:

<tmpno> 0 to 4.

Example:

FK-C16(onu-tm)# showtmp queue 0

editmp upq

Syntax:

editmp upq <tmpno> <llid index> <qsize> <qsize>

Description:

Edit up queue template.

Argument:

<tmpno> upstream queue template no.

<llid index> upstream queue llid index.

<qsize> queue size.

CENTRAL DE SERVIÇOS AO CLIENTE
0800 412100

Possible value:

<tmpno> 0 to 4.

<llid index > 0 to (llid number –1).

<qsize> each link queue # Maximum is 8, up queue max queue # is 10. queue Size Minimum is 2, queue Size Maximum is 100. total up queue max size is 236.

Example:

FK-C16(onu-tm)# editmp upq 0 0 13 13

FK-C16(onu-tm)# editmp upq 0 1 13 13

editmp downpq

Syntax:

editmp downq <tmpno> <port no> <qsize> <qsize>

Description:

Edit down queue template.

Argument:

<tmpno> downstream queue template no.

<port no> down stream port no, 0-ONU UNI port 1, 1-ONU UNI port 2.

<qsize> queue size.

Possible value:

<tmpno> 0 to 4.

<port no > 0,1.

<qsize> Every Queue Size Minimum is 2, Every Queue Size Maximum is 100, Upstream Total Queue Size is 236, Downstream Total Queue Size is 55.

Example:

FK-C16(onu-tm)# editmp downq 0 0 12

deltmp upq

Syntax:

deltmp upq <tmpno> <llid no>

Description:

Del upstream queue template.

Note: You must del from (llid no-1) first, then del (llid no-2) and finally del 0.

Argument:

<tmpno> upstream queue template no

<llid no> up stream queue llid no

Possible value:

<tmpno> 0 to 4

<llid no > 0 to (llid number –1)

Example:

FK-C16(onu-tm)# deltmp upq 0 2 (del from llid number –1 first)

apply queue

Syntax:

apply queue <tmpno> <OLT> <ONU>

Description:

Apply queue template.

Argument:

<tmpno> queue template no.

<OLT> a single slot number of the target OLT.

<ONU> the target ONU.

Possible value:

<tmpno> 0 to 4.

<OLT> 1 to 16 (slot number).

<ONU> onuMAC or onuAlias.

CENTRAL DE SERVIÇOS AO CLIENTE
0800 412100

Example:

FK-C16(onu-tm)# apply queue 0 6 nankang1

show quecfg

Syntax:

show quecfg [<OLT> <ONU>]

Description:

Show queue config.

Argument:

<OLT> a single slot number of the target OLT.

<ONU> the target ONU.

Possible value:

<OLT> 1 to 16 (slot number).

<ONU> onuMAC or onuAlias.

Example:

FK-C16(onu-tm)# show quecfg 6 nankang1

loadtmp queue

Syntax:

loadtmp queue <OLT> <ONU> <tmpno>

Description:

show queue config and load to queue template. The queue template is used to edit and apply.

Argument:

<OLT> a single slot number of the target OLT.

<ONU> the target ONU.

<tmpno> queue template no.

Possible value:

<OLT> 1 to 16 (slot number).

<ONU> onuMAC or onuAlias.

<tmpno> : 0 to 4.

Example:

FK-C16(onu-tm)# loadtmp queue 6 nankang1 2

Field Select

The detail about Field Select is attached on Appendix A Chapter 1.

showtmp field-select

Syntax:

showtmp *field-select* <tmpno>

Description:

Show field select template.

Argument:

<tmpno> queue template no.

Possible value:

<tmpno> 0 to 4.

Example:

FK-C16(onu-tm)# showtmp field-select 0

editmp field

Syntax:

editmp field <tmpno> <index> {<field patterns index> | <layer select> <dword> <bit offset> <field width>}

Description:

Edit field-select template.

Argument:

<tmpno> field-select template no.

CENTRAL DE SERVIÇOS AO CLIENTE
0800 412100

<index> replace index item from field patterns or using <layer select> <dword> <bit offset> <field width>.

<field patterns index> represent the index using field-pattern command.

<layer select> <dword> <bit offset> <field width> refer to Appendix A.

Possible value:

<tmpno> 0 to 4.

<index > 0 to 10.

Example:

FK-C16(onu-tm)# editmp field 0 6 13

You must first build a filed template by using "loadtmp field", and then "show field" to see which field can editable. Mark '*' represents the field is editable.

For example: The field index 6 can be changed.
* 6 IPv4 Protocol 0 5 2 16 8
FK-C16(onu-tm)#editmp field 0 6 13 → The command will replace "Ipv4 Protocol" with "L3 Version".
FK-C16(onu-tm)#showtmp field 0 → The command will list index 0~ 10 field defintion.

field-pattern

Syntax:

field-pattern

Description:

show field pattern definition.

Argument:

None.

Possible value:

None.

Example:

FK-C16(onu-tm)# field-pattern

apply field

Syntax:

apply field <tmpno> [<OLT> <ONU>] <port>

Description:

Apply field select template.

Argument:

<OLT> a single slot number of the target OLT.

<ONU> the target ONU.

<tmpno> field-select template no.

<port> ONU port no.

Possible value:

<OLT> 1 to 16 (slot number).

<ONU> onuMAC or onuAlias.

<tmpno> 0 to 4.

<port> ONU port no, 0-ONU Epon port, 1,2-ONU UNI port.

Example:

FK-C16(onu-tm)# apply field 0 0

show field

Syntax:

show field [<OLT> <ONU>] <port>

Description:

Show onu field select.

CENTRAL DE SERVIÇOS AO CLIENTE
0800 412100

Argument:

<OLT> a single slot number of the target OLT.

<ONU> the target ONU.

<port> ONU port no, 0-ONU Epon port, 1,2-ONU UNI port.

Possible value:

<OLT> 1 to 16 (slot number).

<ONU> onuMAC or onuAlias.

<port> 0,1,2.

Example:

FK-C16(onu-tm)# show onufield 0 or

FK-C16(onu-tm)# show onufield 6 nankang1 0

4-2-3-19 ONU IGMP Snooping

The detail about IGMP is attached on Appendix A Chapter 4.

add vlan

Syntax:

add vlan <OLT> <ONU> <EVID> <UVID> <MaxGroups>

Description:

Add ONU IGMP Snooping. The details illustrates in session 3-3-6-2.

Argument:

<OLT> a single slot number of the target OLT.

<ONU> the target ONU.

<EVID> EPON VID.

<UVID> User VID.

<MaxGroups> The number of IGMP groups.

Possible value:

<OLT> 1 to 16 (slot number).

<ONU> onuMAC or onuAlias.

<EVID> 0 to 4096.

<UVID> 0 to 4096.

<MaxGroups> 0 to 255.

Example:

FK-C16(onu-igmp)# add vlan 6 00-40-c7-00-00-00 5 10 2

del vlan

Syntax:

del vlan <OLT> <ONU> <num>

Description:

Delete ONU IGMP VLAN. The details illustrates in session 3-3-6-2.

Argument:

<OLT> a single slot number of the target OLT.

<ONU> the target ONU.

<num> vlan group number.

Possible value:

<OLT> 1 to 16 (slot number).

<ONU> onuMAC or onuAlias.

<num> 0 to 16.

Example:

FK-C16(onu-igmp)# del vlan 6 00-40-c7-00-00-00 2

CENTRAL DE SERVIÇOS AO CLIENTE
0800 412100

set action

Syntax:

set action <OLT> <ONU> <act>

Description:

Set Action for Unmanaged Groups. The details illustrates in session 3-3-6-2.

Argument:

<OLT> a single slot number of the target OLT.

<ONU> the target ONU.

<act> Action for Unmanaged Groups. The action is Discard (block IPMC, IGMP) or Ignore (forward unchanged).

Possible value:

<OLT> 1 to 16 (slot number).

<ONU> onuMAC or onuAlias.

<act> 0: Discard (block IPMC, IGMP) 1: Ignore (forward unchanged).

Example:

FK-C16(onu-igmp)# set action 6 00-40-c7-00-00-00 0

show vlan

Syntax:

show vlan <OLT> <ONU>

Description:

Show IGMP VLAN Provisioning. The details illustrates in session 3-3-6-2.

Argument:

<OLT> a single slot number of the target OLT.

<ONU> the target ONU.

Possible value:

<OLT> 1 to 16 (slot number).

<ONU> onuMAC or onuAlias.

Example:

FK-C16(onu-igmp)# sh vlan 6 00-40-c7-00-00-00

Action for Unmanaged Groups: Discard (block IPMC, IGMP)

No	EPON VID	User VID	Max Groups
1	5	10	2

set eth

Syntax:

set eth <OLT> <ONU> <type> <tagup> <tagdown>

Description:

Set VLAN Options for Ethernet Parameters. The details illustrates in session 3-3-6-3.

Argument:

<OLT> a single slot number of the target OLT.

<ONU> the target ONU.

<type> VLAN Ethertype (hexadecimal).

<tagup> for the upstream.

<tagdown> for the downstream.

Possible value:

<OLT> 1 to 16 (slot number).

<ONU> onuMAC or onuAlias.

<type> number of hexadecimal.

<tagup> 0-untag ,1-tag.

<tagdown> 0-untag ,1-tag.

CENTRAL DE SERVIÇOS AO CLIENTE
0800 412100

Example:

FK-C16(onu-igmp)# set eth 6 00-40-c7-00-00-00 8100 1 0

show eth

Syntax:

show eth <OLT> <ONU>

Description:

Show VLAN Options for Ethernet Parameters. The details illustrates in session 3-3-6-3.

Argument:

<OLT> a single slot number of the target OLT.

<ONU> the target ONU.

Possible value:

<OLT> 1 to 16 (slot number).

<ONU> onuMAC or onuAlias.

Example:

FK-C16(onu-igmp)# show eth 6 00-40-c7-00-00-00

Ethernet Param

==========

Vlan Ether Type : 0x8100

Tag Up : Use Tag

Tag Down : ---

set snooping

Syntax:

set snooping <OLT> <ONU> <RC> <LMQ> <NG1> <QC1> <NG2> <QC2>

Description:

Set IGMP Snooping parameter. The details illustrates in session 3-3-6-1.

Argument:

<OLT> a single slot number of the target OLT.

<ONU> the target ONU.

<RC> Robustness Count.

<LMQ> Last Member Query.

<NG1> Number Of IGMP Groups (Port 1).

<QC1> Queue For Classification (Port 1).

<NG2> Number Of IGMP Groups (Port 2).

<QC2> Queue For Classification (Port 2).

Possible value:

<OLT> 1 to 16 (slot number).

<ONU> onuMAC or onuAlias.

<RC> 0 to 12.

<LMQ> 0 to 12.

<NG1> 0 to 90.

<QC1> 0 to 6.

<NG2> 0 to 90.

<QC2> 0 to 6.

Example:

FK-C16(onu-igmp)# set snooping 6 00-40-c7-00-00-00 2 4 10 3 15 4

CENTRAL DE SERVIÇOS AO CLIENTE
0800 412100

show snooping

Syntax:

show snooping <OLT> <ONU>

Description:

Show IGMP Snooping parameter. The details illustrates in session 3-3-6-1.

Argument:

<OLT> a single slot number of the target OLT.

<ONU> the target ONU.

Possible value:

<OLT> 1 to 16 (slot number).

<ONU> onuMAC or onuAlias.

Example:

FK-C16(onu-igmp)# show snooping 6 00-40-c7-00-00-00

Robustness Count : 2

Last Member Query : 4

Port 1 Number Of IGMP Groups : 10

Queue For Classification : 3

Port 2 Number Of IGMP Groups : 15

Queue For Classification : 4

show joined

Syntax:

show joined <OLT> <ONU>

Description:

Show IGMP Groups Joined. The details illustrates in session 3-3-6-4.

Argument:

<OLT> a single slot number of the target OLT.

<ONU> the target ONU.

Possible value:

<OLT> 1 to 16 (slot number).

<ONU> onuMAC or onuAlias.

Example:

FK-C16(onu-igmp)# show joined 6 00-40-c7-00-00-00

4-2-3-20 ONU Bridging Config

set bridging

Syntax:

set bridging <OLT> <ONU> <port> <default|<Age> <entry> <mode>>

Description:

Set Bridging Configuration. The details illustrates in session 3-3-7.

Argument:

<OLT> a single slot number of the target OLT.

<ONU> the target ONU.

<port> port number.

<default> using default value of Age Limit, Entry Limit, and Learning mode.

<Age> Age Limit (Unit:8.75ms).

<entry> Entry Limit.

<mode> Learning mode, Forward (802.1d Learning) or Drop Until Learned (MAC Access Control).

CENTRAL DE SERVIÇOS AO CLIENTE
0800 412100

Possible value:

<OLT> 1 to 16 (slot number).

<ONU> onuMAC or onuAlias.

<port> 1 to 2.

<default> Age Limit=64, Entry Limit=8192, Learning mode=0.

<Age> 0 to 32768.

<entry> 0 to 64.

<mode> 0: Forward (802.1d Learning) 1: Drop Until Learned (MAC Access Control).

Example:

FK-C16(onu-bc)# set bridging 6 00-40-c7-00-00-00 1 64 8192 0

show bridging

Syntax:

show bridging <OLT> <ONU> <port>

Description:

Show Bridging Configuration. The details illustrates in session 3-3-7.

Argument:

<OLT> a single slot number of the target OLT.

<ONU> the target ONU.

<port> port number.

Possible value:

<OLT> 1 to 16 (slot number).

<ONU> onuMAC or onuAlias.

<port> 1 to 2.

Example:

FK-C16(onu-bc)# show bridging 6 00-40-c7-00-00-00 1

ONU's MAC = 00-40-c7-00-00-00

port : 1

Age Limit (Unit:8.75ms): 64

Entry Limit : 64

Learning Mode : Forward (802.1d Learning)

show dynabrdgentry

Syntax:

show dynabrdgentry <OLT><ONU>

Description:

Display the automatically learned MAC addresses for the ONU.

Argument:

<OLT> a single slot number of the target OLT.

<ONU> the target ONU.

Possible value:

<OLT> 1 to 16 (slot number).

<ONU> onuMAC or onuAlias.

Example:

FK-C16(onu-db)# show dynabrdgentry 6 00-40-c7-49-01-30

clear dynabrdgentry

Syntax:

clear dynabrdgentry <OLT><ONU><port>

Description:

clear the dynamic MAC entries for the given port of an ONU.

Argument:

<OLT> a single slot number of the target OLT.

CENTRAL DE SERVIÇOS AO CLIENTE
0800 412100

<ONU> the target ONU.

<port> port number.

Possible value:

<OLT> 1 to 16 (slot number).

<ONU> onuMAC or onuAlias.

<port> 1 to 2.

Example:

FK-C16(onu-dt)# clear dynabrdgentry 6 00-40-c7-49-01-30 2

4-2-3-21 ONU Operations

onu-disable

Syntax:

onu-disable <OLT> <ONU>

Description:

Disable ONU user traffic.

Argument:

<OLT> a single slot number of the target OLT.

<ONU> the target ONU.

Possible value:

<OLT> 1 to 16 (slot number).

<ONU> onuMAC or onuAlias.

Example:

FK-C16(onu)# onu-disable 6 00-40-c7-ff-ff-08

onu-enable

Syntax:

onu-enable <OLT> <ONU>

Description:

Enable ONU user traffic.

Argument:

<OLT> a single slot number of the target OLT.

<ONU> the target ONU.

Possible value:

<OLT> 1 to 16 (slot number).

<ONU> onuMAC or onuAlias.

Example:

FK-C16(onu)# onu-enable 6 00-40-c7-ff-ff-08

onu-reboot

Syntax:

onu-reboot <OLT> <ONU>

Description:

Reboot the specified ONU.

Argument:

<OLT> a single slot number of the target OLT.

<ONU> the target ONU.

Possible value:

<OLT> 1 to 16 (slot number).

<ONU> onuMAC or onuAlias.

Example:

FK-C16(onu)# onu-reboot 6 00-40-c7-ff-ff-08

CENTRAL DE SERVIÇOS AO CLIENTE
0800 412100

onu-restore

Syntax:

onu-restore <OLT> <ONU>

Description:

Erase all provisioning records of Non-Volatile Store (NVS) and reboot the ONU. This operation returns the operator provisioning database(e.g. ONU Traffic Management-Rule Setting) to default values.

It include ONU Traffic Management(Field Select, Queue Config, Rules Setting), ONU IGMP Snooping Parameters, ONU Bridging Config.

Argument:

<OLT> a single slot number of the target OLT.

<ONU> the target ONU.

Possible value:

<OLT> 1 to 16 (slot number).

<ONU> onuMAC or onuAlias.

Example:

FK-C16(onu)# onu-restore 6 onualias

show-rfmodule

Syntax:

show rfmodule <OLT> <ONU>

Description:

Show onu rf module state. If the ONU has RF Module, it will display " XX-XX-XX-XX-XX-XX RF Module is on or off ". If the ONU has no RF Module, it will display " There is not RF Module in the ONU ".

Argument:

<OLT> a single slot number of the target OLT.

<ONU> the target ONU.

Possible value:

<OLT> 1 to 16 (slot number).

<ONU> onuMAC or onuAlias.

Example:

FK-C16(onu)# show rfmodule 6 00-40-c7-49-03-98

00-40-c7-49-03-98 RF Module is Off

rfmodule-enable

Syntax:

rfmodule-enable <OLT> <ONU>

Description:

Enable onu rf module.

Argument:

<OLT> a single slot number of the target OLT.

<ONU> the target ONU.

Possible value:

<OLT> 1 to 16 (slot number).

<ONU> onuMAC or onuAlias.

Example:

FK-C16(onu)# rfmodule-enable 6 00-40-c7-49-03-98

rfmodule-disable

Syntax:

rfmodule-disable <OLT> <ONU>

Description:

Disable onu rf module.

CENTRAL DE SERVIÇOS AO CLIENTE
0800 412100

Argument:

<OLT> a single slot number of the target OLT.

<ONU> the target ONU.

Possible value:

<OLT> 1 to 16 (slot number).

<ONU> onuMAC or onuAlias.

Example:

FK-C16(onu)# rfmodule-disable 6 00-40-c7-49-03-98

4-2-3-22 ONU Loopback Test

lblink

Syntax:

lblink <OLT> <LINK> <num> <ps> <tag>

Description:

This command initialize an integrated loopback test procedure aimed purely at a logical link.

Argument:

<OLT> the slot number of the OLT that connects with the target ONU.

<LINK> logical link identificator.

<num> Number of frames to transmit in a loopback test.

<ps> Packet Size. The size of the data portion of an Ethernet frame.

<tag> Specifies the VID of the loopback frames if frame tagging is wished.

Possible value:

<OLT> 1 to 16 (slot number).

<LINK> linkMAC or onuMAC:linkIndex or onuAlias:linkIndex (link index range: 0 to 7).

<num> 1-10000 .

<ps> 46 - 1500 (bytes)

<tag> 0 - 4094

1-4094 are valid values for tagged frame loopback.

0 is used to disable frame tagging.

Example:

FK-C16(onu)# lblink 6 00-40-c7-ff-ff-08 100 200 4094

lbport

Syntax:

lbport <OLT> <LINK> <port> <loc> <num> <ps> <tag>

Description:

This command initialize an integrated loopback test procedure aimed at a logical link and a UNI port at the ONU end. The logical link must have some logical connection relationship with the UNI port,or the test will fail.

Argument:

<OLT> the slot number of the OLT that connects with the target ONU.

<LINK> logical link identificator.

<port> the target port number.

<loc> the location([Mac] or [Phy]) of the target UNI port.

<num> Number of frames to transmit in a loopback test.

<ps> Packet Size. The size of the data portion of an Ethernet frame.

<tag> Specifies the VID of the loopback frames if frame tagging is wished.

Possible value:

<OLT> 1 to 16 (slot number).

<LINK> linkMAC or onuMAC:linkIndex or onuAlias:linkIndex (link index range: 0 to 7).

<port> 1 -> UNI Port 1; 2 -> UNI Port 2.

<loc> 1 -> MAC ; 2 -> PHY.

<num> 1-10000 .

<ps> 46 - 1500 (bytes).

<tag> 0 – 4094.

CENTRAL DE SERVIÇOS AO CLIENTE
0800 412100

1-4094 are valid values for tagged frame loopback.

0 is used to disable frame tagging.

Example:

FK-C16(onu)# lbport 6 onualias:0 1 2 200 100 0

4-2-3-23 Logical Link List

onulinks

Syntax:

onulinks <OLT> <ONU>

Description:

This commands displays some basic information of all provisioned logical links that belong to an ONU.

Argument:

<OLT> a single slot number of the target OLT.

<ONU> the target ONU.

Possible value:

<OLT> 1 to 16 (slot number).

<ONU> onuMAC or onuAlias.

Example:

FK-C16(link)# onulinks 6 00-40-c7-ff-ff-08

FK-C16(link)# onulinks 6 onualias

show allknown-links

Syntax:

Show allknown-links <OLT>

Description:

Show All known Links Of An OLT.

The command retrieves the list of all links configured at the OLT. The links returned include links that have any kind of provisioning, links that were discovered and currently not registered, links with alarms raised against them.

Argument:

<OLT> a single slot number of the target OLT.

Possible value:

<OLT> 1 to 16 (slot number).

Example:

FK-C16(link)# show allknown-links 6

show block-links

Syntax:

Show block-links <OLT>

Description:

Show Block Links Of An OLT.

Argument:

<OLT> a single slot number of the target OLT.

Possible value:

<OLT> 1 to 16 (slot number).

Example:

FK-C16(link)# show block-links 6

CENTRAL DE SERVIÇOS AO CLIENTE
0800 412100

4-2-3-24 Service Level Agreement (SLA)

The detail about SLA is attached on Appendix A Chapter 5.

show sla

Syntax:

show sla <OLT> <LINK>

Description:

Show Downstream and Upstream Service Level Agreement. The details illustrates in session 3-4-2.

Argument:

<OLT> the slot number of the OLT that connects with the target LINK.

<LINK> logical link identificator.

Possible value:

<OLT> 1 to 16 (slot number).

<LINK> linkMAC or onuMAC:linkIndex or onuAlias:linkIndex (link index range: 0 to 7).

Example:

```
FK-C16(link-sla)# show sla 6 00-40-c7-00-00-00:1
SLA                         Enable
                              Upstream   Downstream
                            ========== ===========
Max Bw    (Kbps)              100000    1000000
Min Bw    (Kbps)              100000    1000000
Max Burst (KBytes)               100        100
Mode                         Tolerant    Tolerant
Scheduler Max-tokens (KBytes)      2           2
Scheduler Min-tokens (KBytes)      2           2
DBA Tokens (KBytes)                4         ---
Force Report                     yes         ---
```

set sla

Syntax:

set sla <OLT> <LINK> <dir> <Max> <Min> <Burst> <mode>

Description:

Set Downstream or Upstream Service Level Agreement. The details illustrates in session 3-4-2.

Argument:

<OLT> the slot number of the OLT that connects with the target LINK.

<LINK> logical link identificator.

<dir> direction, downstream or upstream.

<Max> Maximum Allowed Bandwidth (Kbps).

<Min> Minimum Guaranteed Bandwidth (Kbps).

<Burst> Max Burst (KBytes).

<mode> Delay sensitive mode.

Possible value:

<OLT> 1 to 16 (slot number).

<LINK> linkMAC or onuMAC:linkIndex or onuAlias:linkIndex (link index range: 0 to 7).

<dir> 1-downstream 0-upstream.

<Max> 1000 to 1000000.

<Min> 0 to 1000000.

<Burst> 1 to 256.

<mode> 0-Tolerant 1-Sensitive.

Example:

FK-C16(link-sla)# set sla 6 00-40-c7-00-00-00:1 1 1000 300 24 0

CENTRAL DE SERVIÇOS AO CLIENTE
0800 412100

set advance

Syntax:

set advance <OLT> <LINK> <dir> <Max> <Min> [<Tokens> <FR>]

Description:

Set advance Downstream/Upstream Service Level Agreement. The Tokens and FR are optional parameters. The downstream have no set of Tokens and FR. The details illustrates in session 3-4-2.

Argument:

<OLT> the slot number of the OLT that connects with the target LINK.

<LINK> logical link identificator.

<dir> direction, downstream or upstream.

<Max> Scheduler Max-tokens (KBytes).

<Min> Scheduler Min-tokens (KBytes).

<Tokens> DBA Tokens (KBytes).

<FR> Force Report.

Possible value:

<OLT> 1 to 16 (slot number).

<LINK> linkMAC or onuMAC:linkIndex or onuAlias:linkIndex (link index range: 0 to 7).

<dir> 1-downstream 0-upstream.

<Max> 1 to 511.

<Min> 1 to 511.

<Tokens> 0 to 255, default 4.

<FR> 1-yes 0-no, default 1.

Example:

FK-C16(link-sla)# set advance 6 00-40-c7-00-00-00:1 1 8 4 4 1

disable sla

Syntax:

disable sla <OLT> <LINK>

Description:

Disable Upstream/Downstream Service Level Agreement. This command is set in SLA enable. The details illustrates in session 3-4-2.

Argument:

<OLT> the slot number of the OLT that connects with the target LINK.

<LINK> logical link identificator.

Possible value:

<OLT> 1 to 16 (slot number).

<LINK> linkMAC or onuMAC:linkIndex or onuAlias:linkIndex (link index range: 0 to 7).

Example:

FK-C16(link-sla)# disable sla 6 00-40-c7-00-00-00:1 1

enable sla

Syntax:

enable sla <OLT> <LINK>

Description:

Enable Upstream/Downstream Service Level Agreement.

Argument:

<OLT> the slot number of the OLT that connects with the target LINK.

<LINK> logical link identificator.

Possible value:

<OLT> 1 to 16 (slot number).

<LINK> linkMAC or onuMAC:linkIndex or onuAlias:linkIndex (link index range: 0 to 7).

Example:

FK-C16(link-sla)# enable sla 6 00-40-c7-00-00-00:1 1

CENTRAL DE SERVIÇOS AO CLIENTE
0800 412100

default sla

Syntax:

default sla <OLT> <LINK> <direction>

Description:

This command will set default value in the SLA parameters. This command is set in SLA enable. The details illustrates in session 3-4-2.

Argument:

<OLT> the slot number of the OLT that connects with the target LINK.

<LINK> logical link identificator.

<direction> downstream or upstream.

Possible value:

<OLT> 1 to 16 (slot number).

<LINK> linkMAC or onuMAC:linkIndex or onuAlias:linkIndex (link index range: 0 to 7).

<direction> 1-downstream 0-upstream.

Example:

FK-C16(link-sla)# default sla 6 00-40-c7-00-00-00:1 1

4-2-3-25 Multicast SLA

show mcastsla

Syntax:

show mcastsla <OLT> <LINK>

Description:

Show Multicast SLA. The Multicast SLA is enabled in Shared VLAN, TOS Copy Shared VLAN, Priority Shared VLAN, Trans. Pri. Shared VLAN and Double Tagged Shared VLAN. The details illustrates in session 3-4-3.

Argument:

<OLT> the slot number of the OLT that connects with the target LINK.

<LINK> logical link identificator.

Possible value:

<OLT> 1 to 16 (slot number).

<LINK> linkMAC or onuMAC:linkIndex or onuAlias:linkIndex (link index range: 0 to 7).

Example:

FK-C16(link-sla)$ show mcastsla 6 00-40-c7-00-00-00:1

Max Bw : 1000000 Kbps

Min Bw : 1000000 Kbps

Max Burst : 100 KBytes

Mode : Tolerant

set mcastsla

Syntax:

set mcastsla <OLT> <LINK> <MaxBw> <MinBw> <MaxBurst> <mode>

Description:

Set Multicast SLA. The Multicast SLA is enabled in Shared VLAN, TOS Copy Shared VLAN, Priority Shared VLAN, Trans. Pri. Shared VLAN and Double Tagged Shared VLAN. The details illustrates in session 3-4-3.

CENTRAL DE SERVIÇOS AO CLIENTE
0800 412100

Argument:

<OLT> the slot number of the OLT that connects with the target LINK.

<LINK> logical link identificator.

<MaxBw (Kbps)> Maximum Allowed Bandwidth.

<MinBw (Kbps)> Minimum Guaranteed Bandwidth.

<MaxBurst (KBytes)> this is Max Burst.

<mode> Delay sensitive mode.

Possible value:

<OLT> 1 to 16 (slot number).

<LINK> linkMAC or onuMAC:linkIndex or onuAlias:linkIndex (link index range: 0 to 7).

<MaxBw (Kbps)> from 256 to 1000000.

<MinBw (Kbps)> from 256 to 1000000.

<MaxBurst (KBytes)> from 1 to 256.

<mode> 0-Tolerant 1-Sensitive.

Example:

FK-C16(link-sla)# set mcastsla 6 00-40-c7-00-00-00:1 800000 2000 24 0

default mcastsla

Syntax:

default mcastsla <OLT> <LINK>

Description:

This command will set default value in the Multicast SLA parameters. This command is set in SLA enable. The details illustrates in session 3-4-2.

Argument:

<OLT> the slot number of the OLT that connects with the target LINK.

<LINK> logical link identificator.

Possible value:

<OLT> 1 to 16 (slot number).

<LINK> linkMAC or onuMAC:linkIndex or onuAlias:linkIndex (link index range: 0 to 7).

Example:

FK-C16(link-sla)# del mcastsla 6 00-40-c7-00-00-00:1

4-2-3-26 Bridge Mode Setting

The detail about Bridge Mode is attached on Appendix A Chapter 2.

show brdgmode

Syntax:

show brdgmode <OLT> <LINK>

Description:

Show bridge mode.

Argument:

<OLT> the slot number of the OLT that connects with the target LINK.

<LINK> logical link identificator.

Possible value:

<OLT> 1 to 16 (slot number).

<LINK> linkMAC or onuMAC:linkIndex or onuAlias:linkIndex (link index range: 0 to 7).

Example:

FK-C16(link-bm)# show brdgmode 6 nankang1

FK-C16(link-bm)# show brdgmode 6 nankang1:1

FK-C16(link-bm)# show brdgmode 6 nankang1:2

Note: nankang1 mac address is equal to 54-4b-37-13-10-70
nankang1:1 mac address is equal to 54-4b-37-13-10-71
nankang1:2 mac address is equal to 54-4b-37-13-10-72

set brdgmode

Syntax:

set brdgmode <OLT> <LINK> <bridge mode> [<limit>]

Description:

CENTRAL DE SERVIÇOS AO CLIENTE
0800 412100

Set bridge mode

Argument:

<OLT> the slot number of the OLT that connects with the target LINK.

<LINK> logical link identificator.

<bridge mode> the per-Logical Link forwarding mode.

<limit> MAC table entry limit (Optional).

Possible value:

<OLT> 1 to 16 (slot number).

<LINK> linkMAC or onuMAC:linkIndex or onuAlias:linkIndex (link index range: 0 to 7).

<bridge mode> 0 to 15.

<limit> 0~4095 (default: 64).

Example:

FK-C16(link-bm)# set brdgmode 6 nankang1:2 4

hint brdgmode

Syntax:

hint brdgmode.

Description:

Hint bridge mode .

Argument:

None.

Possible value:

None.

Example:

FK-C16(link-bm)# hint brdgmode

Vlan Tag Setting

show vlan-tag

Syntax:

show vlan-tag <OLT> <LINK>

Description:

Show vlan tag

Argument:

<OLT> the slot number of the OLT that connects with the target LINK.

<LINK> logical link identificator.

Possible value:

<OLT> 1 to 16 (slot number).

<LINK> linkMAC or onuMAC:linkIndex or onuAlias:linkIndex (link index range: 0 to 7).

Example:

FK-C16(link-bm)# show vlan 6 nankang1:1

del vlan-tag

Syntax:

del vlan-tag <OLT> <LINK> <vlan id| min vlan> <cos|max vlan tag>

Description:

Del vlan tag.

Argument:

<OLT> the slot number of the OLT that connects with the target LINK.

<LINK> logical link identificator.

<vlan tag| min vlan> network vlan id, if transparent vlan then using min vlan. If others then using vlan tag.

<cos|max vlan tag>if transparent vlan then using max vlan tag. if others then using cos

Possible value:

<OLT> 1 to 16 (slot number).

<LINK> linkMAC or onuMAC:linkIndex or onuAlias:linkIndex (link index range: 0 to 7).

CENTRAL DE SERVIÇOS AO CLIENTE
0800 412100

Example:

FK-C16(link-bm)# del vlan-tag 6 nankang1 1 0

set vlan-tag

Syntax:

set vlan-tag <OLT> <LINK> <vlan tag| min vlan> <cos|max vlan tag> <using tos> <min priority> <max priority> <non-ip>

Description:

Set vlan tag.

Argument:

<vlan tag| min vlan> network vlan id, if transparent vlan then using min vlan. if others then using vlan tag.

<cos|max vlan tag>if transparent vlan then using max vlan tag. if others then using cos.

<min priority> min priority(tos/cos) value downstream.

<max priority>max priority(tos/cos) value downstream.

<non-ip>1-non ip header frame, 0-has ip header frame.

Example:

FK-C16(link-bm)# set vlan-tag 6 nankang1 2 9 11 (nankang1 is transparent vlan)

Note:

<vlan tag> is used for priority remapping single/double/shared vlan , Trans. Shared w/BCast and transparent vlan.

<vlan tag> and <cos> is used for all except transparent vlan, priority remapping single/double/shared vlan , Trans. Shared w/Bcast.

<min vlan> and <max vlan tag> is used for transparent vlan. If it have any vlan values in min ~max vlan, it will have error. e.g. if set 3~5 and there is 4 in the llid, 3 succeed and 4,5 failed.

<using tos> <min priority> <max priority> <non-ip> is used for priority vlan, priority shared vlan, transparent pri. shared vlan.

4-2-3-27 EPON Security

set keytimer

Syntax:

set keytimer <OLT> <LINK> <timer>

Description:

Set Key Exchange Timer. The details illustrates in session 3-4-5.

Argument:

<OLT> the slot number of the OLT that connects with the target LINK.

<LINK> logical link identificator.

timer(sec): the timer of the changing key.

Possible value:

<OLT> 1 to 16 (slot number).

<LINK> linkMAC or onuMAC:linkIndex or onuAlias:linkIndex (link index range: 0 to 7).

timer(sec): available from 0 to 65535.(0:disable).

Example:

FK-C16(link)# set keytimer 6 00-40-c7-00-00-00:1 100

show keytimer

Syntax:

show keytimer <OLT> <LINK>

Description:

Show Key Exchange Timer. The details illustrates in session 3-4-5.

Argument:

<OLT> the slot number of the OLT that connects with the target LINK.

<LINK> logical link identificator.

CENTRAL DE SERVIÇOS AO CLIENTE
0800 412100

Possible value:

<OLT> 1 to 16 (slot number).

<LINK> linkMAC or onuMAC:linkIndex or onuAlias:linkIndex (link index range: 0 to 7).

Example:

FK-C16(link)# show keytimer 6 00-40-c7-00-00-00:1

Key Exchange Timer : 100 sec

4-2-3-28 Link Statistics

show link-statistics

Syntax:

show link-statistics <OLT> <LINK> <onu(0)|olt(1)> <direction>

Description:

Show link statistics.

Argument:

<OLT> the slot number of the OLT that connects with the target LINK.

<LINK> logical link identificator.

<onu(0)|olt(1)> 0-ONU, 1-OLT.

<direction> 0-upstream 1-downstream.

Possible value:

<OLT> 1 to 16 (slot number).

<LINK> linkMAC or onuMAC:linkIndex or onuAlias:linkIndex (link index range: 0 to 7).

<onu(0)|olt(1)>0, 1.

<direction> 0, 1.

Example:

FK-C16(link-sta)# show link-statistics 6 nankang1:1 0 0

FK-C16(link-sta)# show link-statistics 6 nankang1:1 0 1

clear olt-counter

Syntax:

clear olt-counter <OLT>

Description:

Clear all olt counter.

Argument:

<OLT> the slot number of the OLT.

Possible value:

<OLT> 1 to 16 (slot number).

Example:

FK-C16(link-sta)# clear olt-counter 6

clear onu-counter

Syntax:

clear onu-counter <OLT> <LINK>

Description:

Clear all onu counter.

Argument:

<OLT> the slot number of the OLT that connects with the target LINK.

<LINK> logical link identificator.

Possible value:

<OLT> 1 to 16 (slot number).

<LINK> linkMAC or onuMAC:linkIndex or onuAlias:linkIndex (link index range: 0 to 7).

Example:

FK-C16(link-sta)# clear onu-counter 6 nankang1:1

CENTRAL DE SERVIÇOS AO CLIENTE
0800 412100

Soak Time

show olt-alarmsoak

Syntax:

show olt-alarmsoak <OLT> [<alarm id>]

Description:

Show alarm soak time.

Argument:

<OLT> the slot number of the OLT.

<alarm id> alarm identifier, refer to "hint alarm".

Possible value:

<OLT> 1 to 16 (slot number).

<alarm id> 16, 17, 20, 21, 23, 26, 64, 65, 135, 136, 139, 140, 141.

Example:

FK-C16(alarm-epon-soaktime)# show olt-alarm 6 16

set olt-alarmsoak

Syntax:

set olt-alarmsoak <OLT|all> <alarm id> <soak time until set> <soak time before clear>

Description:

Set alarm soak time.

Argument:

<OLT|all> slot number of the OLT.

<alarm id> alarm identifier, refer to "hint alarm".

<soak time until set> alarm occur if remain condiction for a period greater than soak time.

<soak time before clear> alarm clear if remain clear for the clear soak time.

Possible value:

<OLT|all> available from 1 to 16. all represent 16 slots of OLT.

<alarm id> 16, 17, 20, 21, 23, 26, 64, 65, 135, 136, 139, 140, 141.

<soak time until set> Unit: 500 ms.

<soak time before clear> Unit: 500 ms.

Example:

FK-C16(alarm-epon-soaktime)# set olt-alarmsoak 6 136 65400 0

hint alarm

Syntax:

hint alarm

Description:

Hint alarm.

Argument:

None.

Possible value:

None.

Example:

FK-C16(alarm-epon-soaktime)# hint alarm

CENTRAL DE SERVIÇOS AO CLIENTE
0800 412100

4-2-3-29 Logical Link Operations

link-block

Syntax:

link-block <OLT> <LINK>

Description:

Deregisters a logical link and prevent it from registering to its OLT.

Argument:

<OLT> the slot number of the OLT that connects with the target LINK.

<LINK> logical link identificator.

Possible value:

<OLT> 1 to 16 (slot number).

<LINK> linkMAC or onuMAC:linkIndex or onuAlias:linkIndex (link index range: 0 to 7).

Example:

FK-C16(link)# link-block 6 00-40-c7-ff-ff-08:7

FK-C16(link)# link-block 6 onualias7:

link-unblock

Syntax:

link-unblock <OLT> <LINK>

Description:

Makes a logical link being participable in OLT's normal discovery process.

Argument:

<OLT> the slot number of the OLT that connects with the target LINK.

<LINK> logical link identificator.

Possible value:

<OLT> 1 to 16 (slot number).

<LINK> linkMAC or onuMAC:linkIndex or onuAlias:linkIndex (link index range: 0 to 7).

Example:

FK-C16(link)# link-unblock 6 00-40-c7-ff-ff-08:3

The above command uses <Mac:link> to identify the 4th logical link of an ONU.

The command below uses the direct way.The target logical links in both commands in fact are the same.

FK-C16(link)# link-unblock 6 00-40-c7-ff-ff-0b

rediscover

Syntax:

rediscover <OLT> <LINK>

Description:

Deregisters a logical link to force an ONU to re-register this logical link.

Argument:

<OLT> the slot number of the OLT that connects with the target LINK.

<LINK> logical link identificator.

Possible value:

<OLT> 1 to 16 (slot number).

<LINK> linkMAC or onuMAC:linkIndex or onuAlias:linkIndex (link index range: 0 to 7).

Example:

FK-C16(link)# rediscover 6 00-40-c7-ff-ff-08:7

FK-C16(link)# rediscover 6 onualias:0

link-restore

Syntax:

link-restore <OLT> <LINK>

Description:

Erases only provisioning records about a logical link kept in the NVS of an OLT.This operation returns the operator provisioning records which are related with a logical link to default values.

CENTRAL DE SERVIÇOS AO CLIENTE
0800 412100

Argument:

<OLT> the slot number of the OLT that connects with the target LINK.

<LINK> logical link identificator.

Possible value:

<OLT> 1 to 16 (slot number).

<LINK> linkMAC or onuMAC:linkIndex or onuAlias:linkIndex (link index range: 0 to 7).

Example:

FK-C16(link)# link-restore 6 00-40-c7-ff-ff-08:7

FK-C16(link)# link-restore 6 onualias:0

4-2-3-30 System Commands

show

Syntax:

show

Description:

To display the basic information of FK-C16.

Argument:

None.

Possible value:

None.

Example:

FK-C16(system)# show

Model Name : FK-C16

System Description : Managed EPON OLT Chassis

Location :

Contact :

Device Name : FK-C16

CID-RID : 00-00

System Up Time : 0 Days 0 Hours 28 Mins 47 Secs
Current Time : Tue Jan 01 01:40:13 2002
BIOS Version : v1.07
Firmware Version : v0.9
CPU HW-Mech Version : v1.00 - v1.00
CPU Code Number : 123456789012
Chassis HW-Mech Versio : v1.01 - v1.01
Chassis Code Number : 123456789012
Host IP Address : 192.168.1.1
Host MAC Address : 00-40-c7-12-00-38
Device Port : UART * 1 TP * 2
RAM Size : 16 M
Flash Size : 4 M
System Temperature : 27'C
Fan : fan1:3240 fan2:3300 fan3:3120
Voltage : 12.2 V
power2 :AC-good

CENTRAL DE SERVIÇOS AO CLIENTE
0800 412100

set location

Syntax:

set location <location>

Description:

To set the location description of the converter chassis.

Argument:

<location> system location, string length up to 31 characters .

Possible value:

<location> A, b, c, d, ... ,z and 1, 2, 3, ... etc.

Example:

FK-C16 (system)# set location Taipei

set contact

Syntax:

set contact <contact>

Description:

To set the contact description of the converter chassis.

Argument:

<contact> system contact, string length up to 31 characters.

Possible value:

<contact> A, b, c, d, ... ,z and 1, 2, 3, ... etc.

Example:

FK-C16 (system)# set contact Taipei

set device-name

Syntax:

set device-name <device-name>

Description:

To set the device name description of the converter chassis.

Argument:

<device-name> device name, string length up to 31 characters.

Possible value:

<device-name> A, b, c, d, ... ,z and 1, 2, 3, ... etc.

Example:

FK-C16 (system)# set device-name ES-2600

4-2-3-31 IP Commands

set ip

Syntax:

set ip <ip> <mask> <gateway>

Description:

To set the system IP address, subnet mask and gateway.

Argument:

<ip> system ip address.

<mask> system ip subnet mask.

<gateway> system default gateway.

Possible value:

<ip> : 192.168.1.1 or others.

<mask> : 255.255.255.0 or others.

<gateway> : 192.168.1.253 or others.

Example:

FK-C16(ip)# set ip 192.168.1.1 255.255.255.0 192.168.1.253

CENTRAL DE SERVIÇOS AO CLIENTE
0800 412100

set dns

Syntax:

set dns <manual|auto> <ip>

Description:

To set the IP address of DNS server. The DNS is allowed to set "auto" mode when DHCP is enabled.

Argument:

<manual|auto> set dns assigned by dhcp server.

<ip> ip addres. If auto, ip is not needed.

Possible value:

<ip> dns ip address

Example:

FK-C16(ip)# set dns auto (To change the dns mode to auto)

FK-C16(ip)# set dns manual 168.95.1.1 (To change the dns mode to manual)

enable dhcp

Syntax:

enable dhcp <manual|auto>

Description:

To enable the DHCP function of the system, and set dns as auto or manual.

Argument:

<manual|auto>

"manual" means to enable dhcp with manual dns.

"auto" means to enable dhcp with auto dns.

Possible value:

<manual|auto> auto or manual.

Example:

FK-C16(ip)# enable dhcp manual

disable dhcp

Syntax:

disable dhcp

Description:

To disable the DHCP function of the system.

Argument:

None.

Possible value:

None.

Example:

FK-C16(ip)# disable dhcp

show

Syntax:

show

Description:

To display the system's DHCP function state, IP address, subnet mask, default gateway, DNS mode, DNS server IP address and current IP address.

Argument:

None.

Possible value:

None.

Example:

FK-C16(ip)# show

DHCP : Disable

IP Address : 192.168.1.2

Current IP : 192.168.1.2

Subnet mask : 255.255.255.0

Gateway : 192.168.1.253

CENTRAL DE SERVIÇOS AO CLIENTE
0800 412100

DNS Setting : Manual

DNS Server : 0.0.0.0

4-2-3-32 Time Commands

set manual

Syntax:

set manual <YYYY/MM/DD> <hh:mm:ss>

Description:

To set up the current time manually.

Argument:

<YYYY> Year

<MM> Month

<DD> Day

<hh> Hour

<mm> Minute

<ss> Second

Possible value:

<YYYY> 2000-2036

<MM> 01-12

<DD> 01-31

<hh> 00-23

<mm> 00-59

<ss> 00-59

Example:

FK-C16(time)# set manual 2004/12/23 16:18:00

set ntp

Syntax:

set ntp <ip> <timezone>

Description:

To set up the current time via NTP server.

Argument:

<ip> ntp server ip address or domain name.

<timezone> time zone (GMT), range: -12 to +13.

Possible value:

<timezone> -12,-11...,0,1...,13.

Example:

FK-C16(time)# set ntp 210.59.157.10 8

set daylightsaving

Syntax:

set daylightsaving <hr> <MM/DD/HH> <mm/dd/hh>

Description:

To set up the daylight saving.

Argument:

<hr> daylight saving hour

<MM> daylight saving start Month

<DD> daylight saving start Day

<HH> daylight saving start Hour

<mm> daylight saving end Month

<dd> daylight saving end Day

<hh> daylight saving end Hour

CENTRAL DE SERVIÇOS AO CLIENTE
0800 412100

Possible value:

<hr> -5 to +5

<MM> 01-12

<DD> 01-31

<HH> 00-23

<mm> 01-12

<dd> 01-31

<hh> 00-23

Example:

FK-C16(time)# set daylightsaving 3 10/12/01 11/12/01

Save Successfully

show

Syntax:

show

Description:

To show the time configuration, including "Current Time", "NTP Server"," Timezone", " Daylight Saving"," Daylight Saving Start" and "Daylight Saving End"

Argument:

None.

Possible value:

None.

Example:

FK-C16(time)# show

Current Time : Wed Sep 07 10:27:04 2005

NTP Server : 209.81.9.7

Timezone : GMT+8:00

Day light Saving : +3 Hours

Day light Saving Start: Mth: 10 Day: 12 Hour: 1

Day light Saving End : Mth: 11 Day: 12 Hour: 1

4-2-3-33 Account Commands

add

Syntax:

add <name> <type>

Description:

To create a new user. When you create a new user, you must type in password and confirm password.

Argument:

<name> new account name.

<type> account privilege.

Possible value:

<name> A string must be at least 5 characters.

<type> 0-Administrator , 1-Guest.

Example:

FK-C16(account)# add aaaaa 0

Password:

Confirm Password:

Save Successfully

CENTRAL DE SERVIÇOS AO CLIENTE
0800 412100

del

Syntax:

del <name>

Description:

To delete an existing account.

Argument:

<name> existing user account.

Possible value:

<name> A string must be at least 5 characters.

Example:

FK-C16(account)# del aaaaa

Account aaaaa deleted

modify

Syntax:

modify <name>

Description:

To change the password of an existing account.

Argument:

<name> existing user account

Possible value:

<name> A string must be at least 5 characters.

Example:

FK-C16(account)# modify aaaaa

Current username (aaaaa):abcde

Password:

Confirm Password:

Username changed successfully.

Password changed successfully.

show

Syntax:

show

Description:

To display system account, including account name and identity.

Argument:

None.

Possible value:

None.

Example:

```
FK-C16(account)# show
No Account Name      Identity
--- ---------------------  --------
1   admin              : Administrator
2   guest              : guest
3   bbbbb              : guest
```


CENTRAL DE SERVIÇOS AO CLIENTE
0800 412100

4-2-3-34 SNMP Commands

enable

Syntax:

enable snmp

enable set-ability

Description:

To enable snmp and set-ability.

Argument:

None.

Possible value:

None.

Example:

FK-C16(snmp)# enable snmp

FK-C16(snmp)# enable set-ability

disable

Syntax:

disable snmp

disable set-ability

Description:

To disable snmp and set-ability.

Argument:

None.

Possible value:

None.

Example:

FK-C16(snmp)# disable snmp

FK-C16(snmp)# disable set-ability

set

Syntax:

set get-community <community>

set set-community <community>

set trap <#> <ip> <port> <community>

Description:

The Set here is used for the setup of get-community, set-community, trap host ip, host port and trap-community.

Argument:

<#> trap number, range: 1 to 6.

<ip> ip address or domain name.

<port> trap port.

<community> community name.

Possible value:

<trap number> 1 to 6.

<port> 1~65535.

Example:

FK-C16(snmp)# set get-community public

FK-C16(snmp)# set set-community private

FK-C16(snmp)# set trap 1 192.168.1.1 162 public

CENTRAL DE SERVIÇOS AO CLIENTE
0800 412100

show

Syntax:

show

Description:

The Show here is to display the configuration of SNMP.

Argument:

None.

Possible value:

None.

Example:

FK-C16(snmp)# show

SNMP : Disable

Get Community: public

Set Community: private [Enable]

Trap Host 1 IP Address: 0.0.0.0 Port: 162 Community: public

Trap Host 2 IP Address: 0.0.0.0 Port: 162 Community: public

Trap Host 3 IP Address: 0.0.0.0 Port: 162 Community: public

Trap Host 4 IP Address: 0.0.0.0 Port: 162 Community: public

Trap Host 5 IP Address: 0.0.0.0 Port: 162 Community: public

Trap Host 6 IP Address: 0.0.0.0 Port: 162 Community: public

4-2-3-35 Alarm Commands

<<events>>

set email

Syntax:

set email <range>

Description:

To enable the email of the events.

Argument:

<range> set the range of email, syntax 1,5-7, available from 1 to 35.

Possible value:

<range> 1~35.

Example:

FK-C16(alarm-events)# set email 1-3

set trap

Syntax:

set trap <range>

Description:

To enable the trap of the events.

Argument:

<range> set the range of trap, syntax 1,5-7, available from 1 to 35.

Possible value:

<range> 1~35.

Example:

FK-C16(alarm-events)# set trap 1-3

CENTRAL DE SERVIÇOS AO CLIENTE
0800 412100

set all

Syntax:

set all <range>

Description:

To enable email, sms and trap of events.

Argument:

<range>set the range of email and trap of events, syntax 1,5-7.

Possible value:

<range> 1~24

Example:

FK-C16(alarm-events)# set all 1-3

del email

Syntax:

del email <range>

Description:

To disable the email of the events.

Argument:

<range>del the range of email, syntax 1,5-7.

Possible value:

<range> 1~24

Example:

FK-C16(alarm-events)# del email 1-3

del trap

Syntax:

del trap <range>

Description:

To disable the trap of the events.

Argument:

<range>del the range of trap, syntax 1,5-7.

Possible value:

<range> 1~24

Example:

FK-C16(alarm-events)# del trap 1-3

del all

Syntax:

del all <range>

Description:

To disable email and trap of events.

Argument:

<range>del the range of email and trap of events, syntax 1,5-7.

Possible value:

<range> 1~24

Example:

FK-C16(alarm-events)# del all 1-3

show

Syntax:

show

Description:

The Show here is used to display the configuration of alarm event.

Argument:

None.

Possible value:

None.

CENTRAL DE SERVIÇOS AO CLIENTE
0800 412100

Example:

FK-C16(alarm-events)# show

Events	Belong to	Email	Trap
1 Cold Start	Host	v	v
2 Warm Start	Host	v	v
3 Authentication Failure	Host	v	v
4 User Login	Host	v	v
5 User Logout	Host	v	v
6 Temperature Normal	Host	v	v
7 Temperatue Abnormal	Host	v	v
8 Voltage Normal	Host	v	v
9 Voltage Abnormal	Host	v	v
10 Fan RPM Normal	Host	v	v
11 Fan RPM Abnormal	Host	v	v
12 Power Inserted	Host	v	v
13 Power Removed	Host	v	v
14 Power Normal	Host	v	v
15 Power Abnormal	Host	v	v
16 OLT Insert	OLT	v	v
17 OLT Remove	OLT	v	v
18 CNI Link Down	OLT	v	v
19 CNI Link Up	OLT	v	v
20 Standard Link Fault	OLT/ONU	v	v
21 Epon Link Up	OLT/ONU	v	v

22 Epon Link Down	OLT/ONU	v	v
23 Queue Overflow	OLT/ONU	v	v
24 MAC Learing Table Overflow	OLT/ONU	v	v
25 Key Exchange Failure	OLT/ONU	v	v
26 Number Of Links Exceeded	OLT	v	v
27 Jumbo Frame Error	OLT	v	v
28 EPON No Links Discovery	OLT	v	v
29 OLT Bad	OLT	v	v
30 UNI Link Up	ONU	v	v
31 UNI Link Down	ONU	v	v
32 Loopback	ONU	v	v
33 Standard Dying Gasp	ONU	v	v
34 Dying Gasp Power Failure	ONU	v	v
35 ONU Power Abnormal	ONU	v	v

CENTRAL DE SERVIÇOS AO CLIENTE
0800 412100

<<email>>

set server

Syntax:

set server <ip>

Description:

To set up the IP address of the email server.

Argument:

<ip>email server ip address or domain name.

Possible value:

<ip> ip address or domain name.

Example:

FK-C16(alarm-email)# set server 192.168.1.6

set user

Syntax:

set user <username>

Description:

To set up the account of the email server.

Argument:

<username> email server account.

Possible value:

<username> account.

Example:

FK-C16(alarm-email)# set user admin

set mail-address

Syntax:

set mail-address <#> <mail address>

Description:

To set up the email address.

Argument:

<#> email address number.

<mail address> email address.

Possible value:

<#> 1 to 6.

<mail address> email address.

Example:

FK-C16(alarm-email)# set mail-address 1 abc@mail.abc.com

del mail-address

Syntax:

del mail-address <#>

Description:

To remove the e-mail address.

Argument:

<#> email address number, range: 1 to 6.

Possible value:

<#> 1 to 6.

Example:

FK-C16(alarm-email)# del mail-address 2

CENTRAL DE SERVIÇOS AO CLIENTE
0800 412100

del server-user

Syntax:

del server-user

Description:

Delete server, user account and password.

Argument:

None.

Possible value:

None.

Example:

FK-C16(alarm-email)# del server-user

show

Syntax:

show

Description:

To display the configuration of e-mail trap event.

Argument:

None.

Possible value:

None.

Example:

FK-C16(alarm-email)# show

Mail Server : 192.168.1.6

Username : admin

Password : **********

Email Address 1: abc@mail.abc.com

Email Address 2:

Email Address 3:

Email Address 4:

Email Address 5:

Email Address 6:

show (alarm)

Syntax:

show

Description:

The Show for alarm here is used to display the configuration of Trap or E-mail.

Argument:

None.

Possible value:

None.

Example:

FK-C16(alarm)# show events

FK-C16(alarm)# show email

4-2-3-36 Diag Commands

ping

Syntax:

ping <ip>

Description:

To confirm that whether the remote end-station or switch itself is alive or not.

Argument:

<ip> IP address or domain name.

Possible value:

<ip> IP address, e.g. 192.168.2.65 or domain name, e.g. tw.yahoo.com

Example:

FK-C16(diag)# ping 192.168.1.105

CENTRAL DE SERVIÇOS AO CLIENTE
0800 412100

Gateway : 192.168.1.254

192.168.1.105 is alive.

diag

Syntax:

diag

Description:

Diag is used to test if UART, DRAM, Flash, EEPROM are normal or not.

Argument:

None.

Possible value:

None.

Example:

FK-C16(diag)# diag

EEPROM Test : Ok

UART Test : Ok

DRAM Test : Ok

Flash Test : Ok

4-2-3-37 Log Commands

show log

Syntax:

show log

Description:

To display a list of trap log events. When any of log events happens, it will be recorded and using show command in log function to query. Up to 160 log records are supported.

Argument:

None.

Possible value:

None.

Example:

FK-C16(log)# show

Tftp Server : 192.168.3.161

Auto Upload : Disable

No 1 Wed Sep 07 13:13:37 2005 Login [admin]

No 2 Wed Sep 07 13:12:33 2005 POWER A Removed

No 3 Wed Sep 07 13:12:28 2005 Cold Start

show tftp-server

Syntax:

show

Description:

To show the current tftp setting.

Argument:

None.

CENTRAL DE SERVIÇOS AO CLIENTE
0800 412100

Possible value:

None.

Example:

FK-C16(tftp)# show

TFTP Server IP Address: 192.168.1.2

set server

Syntax:

set server <ip>

Description:

To set up the TFTP server IP address for exporting log file.

Argument:

<ip> tftp server IP address or domain name.

Possible value:

<ip> IP address, e.g. 192.168.2.65 or domain name, e.g. tw.yahoo.com

Example:

FK-C16(tftp)# set server 192.168.3.202

upload

Syntax:

export

Description:

To export the current log file to the directory assigned by TFTP Server.

Argument:

None.

Possible value:

None.

Example:

FK-C16(log)# upload

4-2-3-38 Firmware Commands

set tftp-server

Syntax:

set server <ip>

Description:

To set up the TFTP server IP address or domain name for upgrading the system firmware.

Argument:

<ip> tftp server IP address or domain name.

Possible value:

<ip> IP address, e.g. 192.168.2.65 or domain name, e.g. tw.yahoo.com.

Example:

FK-C16(tftp)# set server 192.168.3.159

set upgrade-path

Syntax:

set upgrade-path <filepath>

Description:

To set up the file path and the filename for upgrading the firmware of the system.

Argument:

<filepath> TFTP server file path.

Possible value:

<filepath> TFTP server file path.

Example:

FK-C16(firmware)# set upgrade-path FK-C16.img

CENTRAL DE SERVIÇOS AO CLIENTE
0800 412100

upgrade

Syntax:

upgrade

Description:

To execute firmware upgrade. When finishing the upgrade process, you may choose reboot directly by pressing 'Y' or 'y'; press other keys to return to the system.

Argument:

None.

Possible value:

None.

Example:

FK-C16(firmware)# upgrade

Upgrading firmware ...

Upgrade firmware successfully, Reboot the system

Press Y or y to reboot, others to exit :

show

Syntax:

show

Description:

To show the current firmware upgrade setting.

Argument:

None.

Possible value:

None.

Example:

FK-C16(firmware)# show

TFTP Server IP Address: 192.168.3.159

Path and Filename : FK-C16.img

4-2-3-39 File Commands

set tftp-server

Syntax:

set server <ip>

Description:

To set up the tftp-server that you want to import or export configure file ip address.

Argument:

<ip> tftp server ip address or domain name.

Possible value:

<ip> IP address, e.g. 192.168.2.65 or domain name, e.g. tw.yahoo.com

Example:

FK-C16(tftp)# set server 192.168.2.30

set config-path

Syntax:

set export-path <filepath> or set import-path <filepath>

Description:

To set up the path of configuration-path that you want to import or export configure file.

Argument:

<filepath> Import/Export file path and file name.

Possible value:

<filepath> Import/Export file path and file name.

CENTRAL DE SERVIÇOS AO CLIENTE
0800 412100

Example:

FK-C16(config-file)# set export-path /config/configfile1

FK-C16(config-file)# export-start

or

FK-C16(config-file)# set import-path /config/configfile1

FK-C16(config-file)# import-start

import

Syntax:

Import start / import user-conf

Description:

To execute the action of importing configure file.

Argument:

None.

Possible value:

None.

Example:

FK-C16(config-file)# import start

Importing ...

export

Syntax:

export start/ export user-conf

Description:

To execute the action of exporting configure file.

Argument:

None.

Possible value:

None.

Example:

FK-C16(config-file)# export start

Exporting ...

show

Syntax:

show

Description:

To show the information of TFTP Server IP Address as well as path and filename of configure file.

Argument:

None.

Possible value:

None.

Example:

FK-C16(config-file)# show

TFTP Server IP Address: 192.168.2.30

Path and Filename : /config/configfile1

show backup

Syntax:

show backup-time

Description:

Show backup config file time.

Argument:

None.

CENTRAL DE SERVIÇOS AO CLIENTE
0800 412100

Possible value:

None.

Example:

FK-C16(config-file-backup)# show backup-time

set backup-time

Syntax:

set backup-time <interval backup> <when to backup>

Description:

Set backup config file time.

Argument:

<interval backup(day 0~30)> the interval between the two backup time

<when to backup(hour 0~23)> When backup config file

Possible value:

<interval backup(day 0~30)> 0 ~ 30

<when to backup(hour 0~23)> 0 ~ 23

Example:

FK-C16(config-file-backup)# set backup-time 2 13 (You export all Host/OLT/ONU config file at 1 p.m. every two days.)

set effect

Syntax:

set effect <one-time> <periodic>

Description:

Set effect period.

Argument:

<one-time> 1-on, 0-off.

<periodic> 1-on, 0-off.

Possible value:

<one-time> 0 , 1.

<periodic> 0 , 1.

Example:

FK-C16(config-file-backup)# set effect 1 0

4-2-3-40 General Commands

hostname

Syntax:

hostname <name>

Description:

To change the hostname.

Argument:

<name> hostname.

Possible value:

<name> hostname, max. 40 characters.

Example:

FK-C16# hostname Company

Company#

autologout

Syntax:

autologout <time>

Description:

To set up the auto logout time. When you idle over the configuration time, the system will auto logout.

Argument:

<time> range 1 to 3600 seconds, 0 for autologout off.

CENTRAL DE SERVIÇOS AO CLIENTE
0800 412100

Possible value:

<time> 0,1 to 3600.

Example:

FK-C16# autologout 5

Set autologout time to 5 seconds

reboot

Syntax:

reboot

Description:

To reboot the system.

Argument:

None.

Possible value:

None.

Example:

FK-C16# reboot

Appendix A- EPON Technical Specification

A-1 ONU Data Path Configuration

A-1-1 Overview

The ONU data path consists of hardware engines for classification, queuing, and scheduling. Each type of ONU provides similar functionality, but may have different amounts of resources available. This document describes the resources available and the method for configuring the data path.

"Classification" is the process of deciding which frames are forwarded to particular queues and passed through the ONU. "Filtering" is the process of deciding which frames should be dropped. An ONU has a queue configuration, which describes the number and sizes of queues in use, as well as their connectivity to user ports and EPON logical links. An ONU also has a classification scheme, which is a set of rules describing how traffic is forwarded to queues, and possibly a set of filtering rules to control access to the PON.

A-1-2 Filtering, Classification, and Access Control

Each UNI port on the ONU is associated with a particular lookup engine (LUE). The role of the LUE is to examine upstream frames and decide what to do with those frames. Possible results of LUE processing include filtering and classification of into particular priority queues.

The LUE associated with an ONU UNI port is referred to as an ELU/GLU (Ethernet Lookup Engine/Gigabit Lookup Engine). The LUE associated with the EPON port is known as the DLU (Downstream Lookup Engine).

The LUEs can be configured. This is accomplished by provisioning rules. "Access control" rules are the opposite of filtering rules, and selectively admit frames to the network, often based on authenticated source addresses. "Classification" rules are used to forward a class of frames to a particular queue, generally based on criteria such as a L2 or L3 priority field, or the type of traffic as indicated by Ethertype or a TCP/UDP port number. "Filtering" rules are used to block particular frames to discard unwanted traffic. It is possible for a single rule to serve more than one purpose.

CENTRAL DE SERVIÇOS AO CLIENTE
0800 412100

A-1-2-1 Rules Defined

A **rule** consists of a number of **clauses**. Each clause is a Boolean operation which tests a particular **field** in a frame against a value, using a particular operator. If all clauses in a rule evaluate to TRUE, the rule is said to **match** the frame. That is, the results of each clause are logically ANDed together to determine whether the rule matches the frame. The **result** of a matching rule may be applied to the frame.

FieldSelect : Returns a specific contiguous sequence of bits from the input frame

Operator : The tested condition (equal to, greater than, etc.)

Value : Value used for comparison

Operator symbol meaning is:

F : Never match

== : Equal to

!= : Not equal to

<= : Less than or equal to

>= : Greater than or equal to

exists : Match when field exists in the frame

!exists : Match when field does not exist in the frame

T : Always match

Each rule also has an **action**. The action is the effect on the frame if the rule matches the frame. Results in filtering rules contain an action to discard a frame. Results in classification rules contain an action to forward the frame, the queue to which the frame should be forwarded, and optionally additional actions such as inserting or deleting a VLAN tag. Actions are discussed in more detail below.

Each rule has a **precedence** value. All rules in the lookup engine are matched against every frame in an unspecified order. It is possible to have more than one rule that matches a single frame, which rules have different actions. The precedence value is used to resolve cases where more than one rule matches a frame. The action of the rule with the numerically lowest precedence value is used; that is, precedence 0 is the most dominant rule

Conflicting rules at the same precedence level should not be created. The result in such a case will be the action of one or the other rule, but which result is chosen will be indeterminate and could even vary from frame to frame.

The rest of this document uses a pseudocode representation of a rule as shown below.

10: if (EtherType == 0800) then queue = link 0 queue 0;

The leading integer denotes the precedence of the rule (discussed below). Clauses are represented by the conditions in parentheses. The action of the rule follows the "then" keyword.

Every rule in the LUE table is evaluated for every frame. Thus, the condition "if (Ethertype == 8808) OR (Ethertype == 8809)" can be represented as two rules, each with one clause, rather than one rule with two clauses combined with OR.

10: if (Ethertype == 8808) then discard;
10: if (Ethertype == 8809) then discard;

A-1-2-2 Rule Results

The result of the lookup engine is a set of actions to take. After processing all rules, the lookup engine has accumulated instructions to do some or all of the following:

- Forward or discard a frame
- Set the destination queue for a frame
- Delete an existing VLAN tag
- Add a new VLAN tag
- Set VID
- Set CoS

Each of these results in maintained separately, each with its own current precedence value. So, for example, one rule might set a destination queue, while another rule decides to forward a frame, and yet a third independent rule decides to add a VLAN tag. All three of these rules might exist at different precedence.

The "Delete VLAN tag" operation removes the outermost VLAN tag a frame may have had upon entering the port. Padding is applied if necessary to maintain the minimum frame size, and the frame CRC is recalculated.

"Add VLAN tag" inserts a new VLAN tag as the outermost VLAN tag of the frame. The CRC of the frame is recalculated. When a new tag is created, the COS and VID value used is that of the highest precedence result that have set the COS or VID.

Both the Add and Delete VLAN tag operations may be applied to the same frame. In this case, the lookup engine first removes the old VLAN tag and then adds a new one. Thus, if both delete and add operations are specified for

CENTRAL DE SERVIÇOS AO CLIENTE
0800 412100

the same frame, the VLAN tag will be replaced. If the rule set is such that the new VLAN tag depends on the value of the old VLAN tag, the effect is to "translate" the VLAN tag.

Note that frame modification takes place after all rules have been matched against the frame. Thus, any rules that match VLAN tag fields are matched against the frame as it arrives at the port, not against the final frame.

Rule action codes often contain several results combined for convenience. For example, it is common with simple rule sets to both set a destination queue and forward the frame. So, there is a "Set Destination, Forward" action code that sets both results with one rule. Similarly, it is often convenient to add a VLAN tag with a specific VID, so there is a combined "Add VLAN Tag; Set VID" action which both sets the Add VLAN flag and the VID value.

A-1-2-3 Use of Precedence to Create Unambiguous Rule Sets

If the rules that forward to QA can match the same frame as the rules that forward to QB, the result is ambiguous. Consider an attempt to forward all IP traffic into a low priority queue, except for that traffic from one privileged station with MAC address 00-0d-b6-12-34-56.

10: if (SA == 00-0d-b6-12-34-56) then queue = link 0 queue 0;

10: if (Ethertype == 0800) then queue = link 1 queue 1;

Unfortunately, this rule set is ambiguous. Consider a frame from 00-0d-b6-12-34-56 that is also an IP frame. Both rules match this frame. The result in such a case, as described above, is undetermined. The frame might appear in queue 0, or it might appear in queue 1.

Rule precedence is used to remove the ambiguity from such cases. Consider:

8: if (SA == 00-0d-b6-12-34-56) then queue = link 0 queue 0;

10: if (Ethertype == 0800) then queue = link 1 queue 1;

With this rule set, the problematic frame will still match both rules. However, the differing precedence of the rules means that the result of the precedence 8 SA rule will be used instead of the precedence 10 Ethertype rule.

Note that filtering rules at the same precedence do not have the same ambiguity as classification rules. Since the result of both rules is the same -- to discard -- in some sense it does not matter which rule matches to produce the discard result. However, precedence is still useful with filtering rules when applied in addition to the rules in the classification scheme.

The purpose of filtering rules is to block certain types of frames. Typically, these rules have higher precedence than any classification rule. For example, a rule to block traffic from a particular device with MAC address 01:23:45:67:89:AB could be written as:

2: if (SA == 01:23:45:67:89:AB) then discard;

Note that the rule precedence for the discard example is shown as '2' while the forwarding example is shown as '5'. If all three of these rules were programmed in the lookup engine at the same time, the forwarding rules would try to forward traffic to one of two priority queues for all sources. The filter rule, at higher precedence, would override this forwarding attempt for one particular source. So, the net result would be priority traffic for all sources except 01:23:45:67:89:AB, from which all traffic is dropped.

A-1-3 ONU L2/L3/L4 Field Selector

A-1-3-1 Lookup Engine Field Definition

The lookup engines implement programmable "fields" which point to particular areas of interest in a frame. These fields are used in rule clauses to decide the fate of a frame. Fields are thus typically portions of a frame such as addresses, any of several priority fields or protocol types in different layers. The ONU supports 11 fields. Several fields are predefined by firmware, while others are configurable through the commands.

Lookup Engine Field Definitions

No.	Bits	Down	Up
0	48	L2 Dest Addr	L2 Dest Addr
1	48	L2 Source Addr	L2 Source Addr
2	32	Link index	User
3	32	L2 Length/Type	L2 Length/Type
4	32	VLAN ID	VLAN ID
5	32	User	User
6	32	IPv4 Protocol	IPv4 Protocol
7	32	User	User
8	16	User	User
9	16	User	User
10	16	User	User

A field may be any string of bits in a frame, starting at an offset from the beginning of a particular L2/3/4 header, up to 32 bits wide for fields 0..7. Fields 8..11 in the ONU can be up to 16 bits wide. The ONU fimware forms a field descriptor code which packs the protocol layer, offset into that layer, least significant bit of the field, and the field bit width into a single, compact. This breakdown of the 16-bit field select code is shown in the following table.

CENTRAL DE SERVIÇOS AO CLIENTE
0800 412100

Bit Field Select Codes

Bits	Value
16:12	Bit Width (0..31 represents 1..32)
11:7	Bit offset (LSB)
6:3	Dword offset (Dword = 32 bits)
2:0	Layer Select

Note that the bit width is one less than the actual width of the field. Since a field cannot be of width zero, this convention allows encoding widths up to 32 bits in only five bits.

For the purposes of this document, a "dword" is a 32-bit word. The dword offset is a 4-bit field, and so the lookup engine can reach up to 64 bytes into a particular protocol layer. This makes the field descriptor code a 17-bit value as shown below.

bits wide, starting at bit 0.

16	15	14	13	12	11	10	9	8	7	6	5	4	3	2	1	0
Width (5 bits)					Bit offset (5 bits)					Dword (4 bits)				Layer (3 bits)		
0	1	1	1	1	0	0	0	0	0	0	0	0	0	0	1	0
0	F				0					0				2		

A-1-3-2 Layer Select Values

As described earlier, the 17-bit field select code consists of a 3-bit layer select, a 4-bit dword offset, a 5-bit bit offset, and a 5-bit data width value. The table below show the six possible values that can be use for the 3-bit layer select. Setting the 3-bit value to zero disables the 16-bit field select.

The choice of the layer impacts the available choices for the other bits in the field select descriptor code.For example, if the layer 2 / Type field is chosen (bits[2:0] = 2), the dword offset can only be set to 0 as the layer 2 header is only 16-bits wide. The classification engine only parses and inspects fields with the chosen layer. The following paragraphs will explain in detail with the aid of tables, what fields of each layer can be selected for classification. The tables show the available fields and their locations within each dword. The dword offset is such that the first 32 bits shown are dword offset = 0, the next 32 bits are dword offset = 1 and so on.

Number	Layer	Common Fields Found in Layer
0	Disabled Field Select	
1	Preamble/Layer 2 - Header	LLID, DA, SA, DSAP, SSAP, OUI
2	Layer 2 - Type field [1]	L2 Type field [1]
3	Layer 2 - VLAN tag [2]	L2 VLAN tag [2]
4	(Reserved)	
5	Layer 3 – IPv4 Header	TOS, Protocol, IP DA, IP SA
6	Layer 4 – XXX/IPv4 Header	TCP port, UDP port
7	Layer 3 – IPv6 Header	Traffic Class, Flow label, Source Address
8	Layer 3 - Generic	ARP MAC and IP SA, DA
9 to 255	(Reserved)	

Preamble/Layer 2 Header (1)

The EPON downstream provides an additional frame header that carries the link index and LLID. By using the preamble layer select, these values can be used for filtering or classification. The ONU hardware replaces the CRC-8 carried in the preamble header with the link index. The link index provides an offset value from the ONU base MAC address for the link. For example, an ONU with 4 links would receive packets on LLID index 0 to 3, where the MAC address for the ONU is the ONU base MAC address

plus the LLID index value. In the case that the LLID is not on this ONU, the frame has a link index one greater than the maximum number of receive links (8). Field parsing in the preamble layer is allowed only on the EPON interface, but not on the standard Ethernet interfaces (UNI, CNI/LNP/NNI).

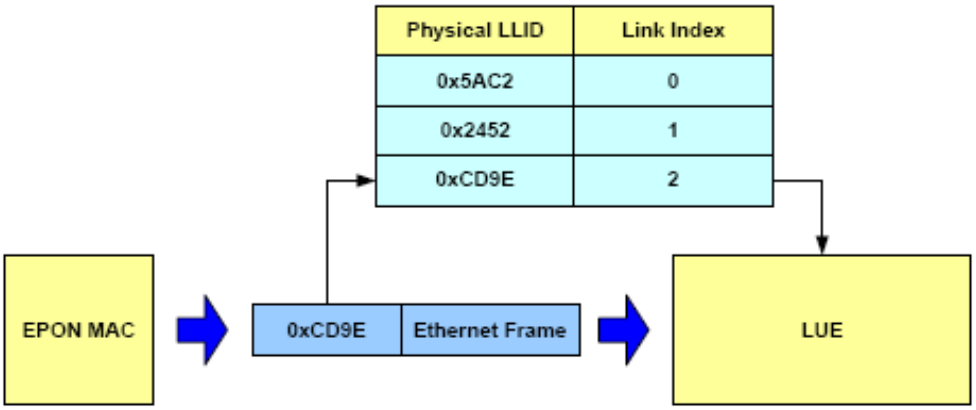
CENTRAL DE SERVIÇOS AO CLIENTE
0800 412100

The table shows a frame without the SNAP encapsulation. Although the L2 type field is present in both of these tables, it is at different dword offsets because the SNAP encapsulation shifts the L2 Type Field deeper into the packet. The different dword offsets make it impossible to gather the type field of the packet using this layer select into a single field. Therefore it is recommended that the type should be parsed using the L2 type field (field select[2:0] = 2) since this field will always exist when the value is an EtherType, not a length field (when using field select[2:0] = 2, the hardware will validate that a type field is present).

31	30	29	28	27	26	25	24	23	22	21	20	19	18	17	16	15	14	13	12	11	10	9	8	7	6	5	4	3	2	1	0
Reserved (Unknown)																															
Reserved (Unknown)								LLID Value														LLID Index									
Reserved (Always 0)																L2 DA [47:32]															
L2 DA [31:0]																															
L2 SA [47:16]																															
L2 SA [15:0]																L2 Length Field [15:0]															

Use of the Link Index Field Select Value

LLID values are dynamically assigned by the OLT, each time a particular Logical Link is discovered. The LLID value assigned for a particular MAC may differ from a previously assigned value. For this reason the ONU maintains a mapping table between the physically LLID values and the Link's MAC address. The Link Index is that integer that when added to the ONU base MAC address specifies a particular Logical Link. Every downstream classification rule **MUST** include a clause qualifying the Logical Link on which a particular frame was received, such as: Link Index == 2, to specify the Link with MAC address = base MAC + 2. Note: One important point to remember is that the Link Index is not required to qualify filtering rules (only classification rules).



For the Link Index field select the equality operator is the most useful. Note that every rule in the downstream classification scheme **must** contain a clause matching the link index equal to a value. This information is used by

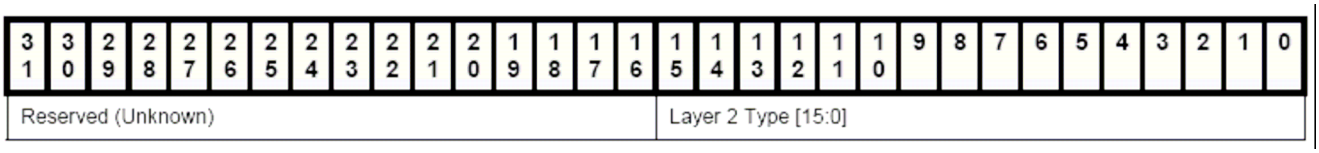
the ONU firmware to determine which logical links are associated with which queues in the downstream direction. Each queue should be "owned" by one and only one logical link.

If the Link Index is not used to qualify the Logical Link, traffic may still flow through the ONU. However many functions of the ONU, such as link statistics or EPON MAC loopback, will cease to behave as expected. The hardware is capable of directing traffic from multiple logical links into a single queue. But if the ONU is configured in this manner, then there is no longer a unique mapping from queue to logical link. So, for example, the queue received frame count will count frames from both links, and there is no way to distinguish them. Similarly, looping back one logical link would affect both. Implementations that need a full feature set conforming to IEEE 802.3ah should always maintain a unique queue to logical link association in the classification scheme.

Layer 2 Type field (2)

The layer 2 type field can be found in three possible frame locations:
1) Frames without a length field or a VLAN tag will have a type field following the source address.
2) Frames with a VLAN tag and no length field will have the type field after the last VLAN tag in the stack.
3) Frames with a SNAP LLC will contain the type field after the OUI.

The layer 2 type field allows for a single layer and offset for all 3 cases as the hardware will validate the packet to verify the presence of a type field regardless of its location. This means that a length field or a VLAN protocol type (i.e. 0x8100) will never inadvertently be selected using this layer select since the hardware will correctly parse the true location of the final layer 2 protocol type. The last EtherType field in the frame will be the one that is selected by the LUE.



CENTRAL DE SERVIÇOS AO CLIENTE
0800 412100

Layer 2 – VLAN tag (3)

The ONU can parse up to 3 VLAN tags in a stack. A Dword offset of 0, always points to the outermost tag with higher offsets to the next tags. The table below shows the position of each of the 3 VLAN tags. Each VLAN tag contains 3 fields. PRI[2:0] contains the VLAN priority bits while the VID[11:0] contains the VLAN identification tag. The C field is the canonical format identifier. If a VLAN tag is not present, any field for the tag will show up as "not present". Checking for a "does not exist" or "exists" condition on the VID is the best way to check for the presence of a tag. Based on the Layer Select, all necessary fields are validated by the LUE. For instance, when Layer Select 3 is specified, the frame will not match unless the EtherType field == 0x8100 (the VLAN EtherType). It does this validation for up to 3 tags. Therefore if a dword offset of 1 or 2 is used (to pecify the 2nd or 3rd tag), the LUE will produce a "not present" result if only one tag is found. Therefore it is not appropriate to use this layer select to parse fields in upper layers of the packet. All necessary validation up to the beginning of the layer is erformed by the ONU. It is not recommended to use this layer select field when attempting to parse the type or length field as Field select values 1 and 2 are more appropriate for that purpose.

31 30 29 28	27 26 25 24 23 22 21 20 19 18 17 16	15 14 13 12 11 10 9 8 7 6 5 4 3 2 1 0
PRI[2:0]	C VID [11:0]	Layer 2 Type/Len [15:0]
PRI[2:0]	C VID [11:0]	Layer 2 Type/Len [15:0]
PRI[2:0]	C VID [11:0]	Layer 2 Type/Len [15:0]

Layer 3 – IPv4 (5)

The IPv4 header can be parsed for the Type of Service (TOS), source IP address, destination IP address, or any other portion of the header. It is a common practice, to use only the upper 3 bits of the TOS field (IP Precedence) to signify class of service. It is not necessary to take the field based on the header definition. The hardware will handle any string of bits in a 32-bit word. Please note that the LUE will validate that the packet is a IPv4 packet by checking the Ether Type field. Therefore packets other than IPv4 will produce a "not present" result when using this layer select. Data beyond the IPv4 header is not available for parsing when using this layer select.

31 30 29 28	27 26 25 24	23 22 21 20 19 18 17 16	15 14 13 12 11 10 9 8 7 6 5 4 3 2 1 0
Version	Hdr Len	Type of Service	Length of datagram
Identification			Flags / Fragment Offset
Time to Live		Protocol	Header Checksum
Source IP Address			
Destination IP Address			
Options (if any)			

Layer 4 – Generic over IPv4 (6)

It is often desirable to filter packets based on layer 4 (UDP or TCP) port numbers. The ability to block ports can be used to disable certain applications from using the PON. IPv4 layer 4 parsing will only be done on IPv4 frames. It is also required that layer 4 header be within the first 60 bytes of the packet. Rules that use the generic layer 4 fields should qualify it with the IPv4 protocol type to ensure the frame being examined actually carries the desired L4 protocol. The UDP header is shown below as a reference for one

common L4 protocol.

Note that if IP fragmentation is allowed on the network, L4 headers such as UDP and TCP headers exist only in the first IP fragment. If fragmentation is in use, then L4 rules will likely need to have an additional clause to match only the first fragment of a series; that is, to check the IPv4 fragment offset field is zero.

31	30	29	28	27	26	25	24	23	22	21	20	19	18	17	16	15	14	13	12	11	10	9	8	7	6	5	4	3	2	1	0
Source Port [15:0]																Destination Port [15:0]															
Length [15:0]																Checksum [15:0]															

A-1-4 ONU Rule Setting Concept

A-1-4-1 Tips for Designing Rules

Designers of classification schemes should consider including a default rule for forwarding traffic. This rule should exist at the lowest user precedence level (15), and should always forward traffic. The "always" operator is useful to create a rule that is always true. For example, "if always then queue = link 0 queue 0" would be a default rule that puts any frame into the first queue for the first link. Other rules can then be set at precedence 14 that override the default rule. Another way to create a rule that is always true is to check for Field 0 (MAC DA) "exists". All valid frames must have a MAC DA, so the "exists" operator is always true for this field.

Note that a default rule can save clauses in the rule table. Consider the following two classification schemes:

14: if (field 5 >= 0) and (field 5 <= 3) then queue = link 0 queue 0;

14: if (field 5 >= 4) and (field 5 <= 7) then queue = link 0 queue 1;

This pair of rules requires four clauses and completely specifies a classification scheme with two precedence queues. Compare to this set:

CENTRAL DE SERVIÇOS AO CLIENTE
0800 412100

15: if (DA exists) then queue = link 0 queue 1;

14: if (field 5 >= 0) and (field 5 <= 3) then queue = link 0 queue 0;

This rule set accomplishes the same task with three clauses instead of four. A more extreme example using four precedence queues might be:

15: if (always) then queue = link 0 queue 3;

14: If (field 5 == 2) then queue = link 0 queue 0;

14: If (field 5 == 4) then queue = link 0 queue 1;

14: If (field 5 == 6) then queue = link 0 queue 2;

In this case, TOS 4 and TOS 6 each get a queue. TOS values 0, 1, 3, 5, and 7 go into the lowest precedence queue. It would take eight clauses to explicitly specific this result without a default, whereas the default rule allows specifying the result in four.

Default rules can also guard against leaving some traffic without a destination, and thus dropped. Some applications may desire the default action to drop frames. Many, however, should attempt to forward all frames, and a default rule is a good way to ensure that the other classification rules do not leave any gaps in their description of the traffic to be forwarded.

A-1-4-2 Conditions Involving Logical OR

Note that all clauses of a rule are ANDed together. There is no representation of a logical OR operator. Since all rules are matched against a frame, an OR condition can be created by entering two (or more) rules. That is, to create a filter scheme that drops traffic if SA = 1 OR SA = 2, create two rules:

if (SA == 1) then discard;

if (SA == 2) then discard;

To implement a condition such as "(SA == 1) and ((EtherType == 0800) or (EtherType < 1536))", create two rules by distributing the first clause thus:

if ((SA == 1) and (EtherType == 0800)) then discard;

if ((SA == 1) and (EtherType < 1536) then discard;

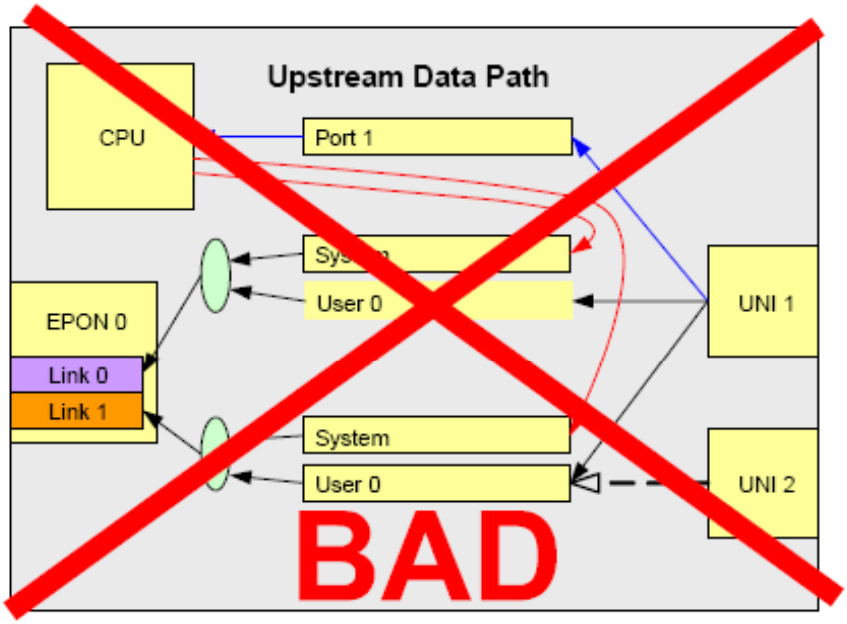
That is, you can consider a rule set to be the sum of products form of the desired Boolean expression, where each conjunctive term corresponds to a single rule.

A-1-5 ONU Bad Rule Example

Please avoid to set the following ONU rules.

A-1-5-1 One FIFO Fed by Multiple UNI Ports

In the figure below, both UNI 1 and UNI 2 are classified into the same priority FIFO. Each FIFO may have only one associated ingress port. Otherwise, frames will be lost.



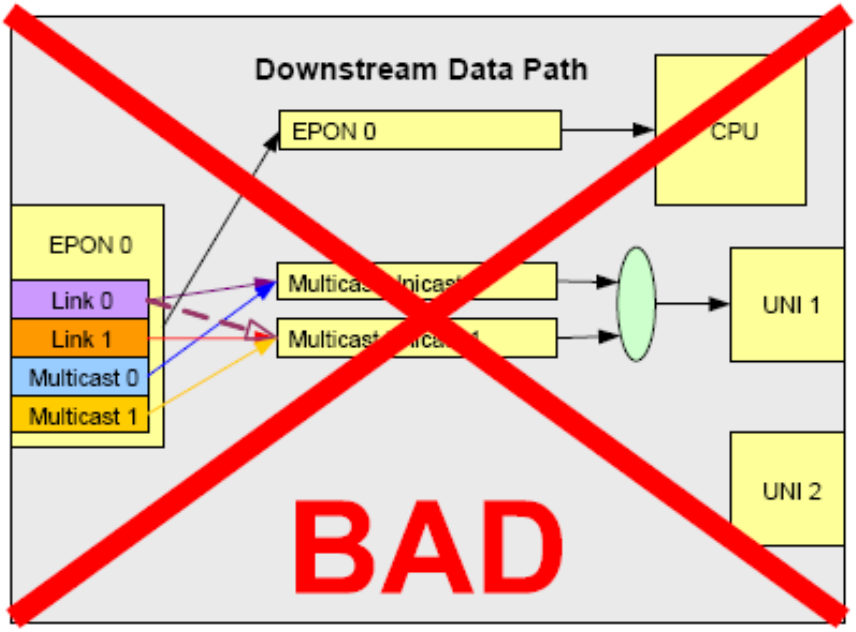
The mechanism to resolve such a race condition would involve complex hardware, such as a second layer of priority queues. A far less costly solution is to simply allocate each port its own priority queue.

This example illustrates a second problem. Link 1 is fed by 2 different ports. This is functionally acceptable, but will cause certain link statistics to be calculated as the sum of both links.

CENTRAL DE SERVIÇOS AO CLIENTE
0800 412100

A-1-5-2 Two Links Sharing the Same Downstream FIFO

If data from two links is classified into the same downstream FIFO, certain functions in the ONU, such as statistics gathering will not work as expected. Teknovus strongly recommends against such configurations.



A-2 Bridging

A-2-1 Introduction

Ethernet Passive Optical Network (EPON) is a point-to-multipoint (P2MP) network. An Optical Line Terminal(OLT) serves multiple Optical Network Units (ONUs). The IEEE 802.3 standard specifies Point-to-Point Emulation (P2PE) functionality that emulates a logical point-to-point topology over the physical P2MP fiber.

The P2PE operation uses Logical Link IDs (LLIDs) to address the ONU or set of ONUs. Each ONU is assigned one or more LLIDs by the OLT using the MPCP registration protocol.

A-2-2 MAC Address Learning

The L2 MAC DA is often used to switch traffic to a particular destination. Firmware supports automatic MAC learning for this purpose. Automatic MAC learning might also be enabled in order to construct Access Control Lists, or simply to monitor the addresses of user stations connected to the network.

The EPON system supports MAC address learning at the ONU and the OLT. The ONU learns MAC source addresses (SAs) as it receives upstream traffic on its User Network Interface (UNI) port. If a frame received on the UNI

contains a destination address (DA) equal to a previously learned SA, it is discarded. The MAC address is known to exist in the local network. This learning prevents unnecessary upstream traffic from being sent to the OLT.

The OLT learns SAs as they are received on its PON port from the ONU. The OLT records the LLID on which each SA was sent upstream. With this information, the OLT builds a table for associating downstream traffic received at its Network Network Interface (NNI) with corresponding LLIDs. Based on system configuration, frames with unknown LLIDs are discarded or sent downstream on a broadcast LLID.

A-2-3 ONU MAC Address Learning

A-2-3-1 Upstream

The ONU MAC address table supports line-rate hardware learning. As frames enter the UNI from the subscriber network, the LUE maintains a table of MAC addresses built from the SA of each user frame. When a frame's upstream DA equals an entry in the table, the frame remains on the subscriber network. It is not sent upstream to the OLT.

The MAC learning function has two configurable options for the case when the MAC table becomes full: Overwrite and Overflow. If Overwrite is enabled, the oldest learned address in the table will be replaced with the currently learned address. Note that the definition of "oldest" depends on whether or not MAC address aging is enabled.

With MAC aging enabled, hardware refreshes the timestamps of addresses as frames flow through the ONU. Therefore, the "oldest" address is the one least recently seen by the ONU. With MAC aging disabled, the "oldest" address will be the first one to have been learned, without regard for later use.

If Overflow is enabled, the newly learned address will discarded and an alarm condition set to indicate that the MAC address table is full. New addresses cannot be learned until space becomes available in the MAC table, either by addresses aging out of the table, or by management deleting an address.

A-2-3-2 Downstream

The ONU does not use the MAC address table to switch downstream traffic. Downstream forwarding decisions based on MAC address are made at the OLT. As long as each logical link is connected to only one UNI port at the ONU.

CENTRAL DE SERVIÇOS AO CLIENTE
0800 412100

A-2-4 OLT MAC Address Learning

A-2-4-1 Upstream

OLT learning is done by firmware running on the integrated ARM-7 processor. Frames enter the OLT chip from the PON port connected to the ONUs. As each frame passes through the OLT, the firmware parses the MAC SA and maintains a table of MAC addresses. This table associates each MAC address with an LLID. The OLT uses the table to make downstream forwarding decisions.
The MAC address table has two configurable options: Aging and Limiting.

A-2-4-2 Downstream

Downstream frames entering the OLT CNI port with known MAC addresses are forwarded to a per-determined destination LLID. The associated LLID is determined from the MAC address table, as described above. Downstream frames with unknown MAC addresses (addresses not previously learned) are flooded or discarded, according to system configuration. If the Discard Unknown MAC option is selected, the frames are dropped at the OLT. If the option is not selected, the frames are sent downstream on the broadcast or shared VLAN broadcast LLID.

A-2-5 Legacy Bridging Modes

Some common terminology is used in the naming of Bridging modes.

Shared – A domain to which more than one physical ONU belongs. Shared domains create an additional logical link used for flooding traffic to the domain. Shared domains are typical bridges.

Dedicated – A domain to which only one physical ONU belongs. A Dedicated domain is essentially a point-to-point pipe.

Priority – Priority modes use several logical links to efficiently carry multiple prioritized services across the PON. The several links to one physical ONU can be considered a logical pipe which carries all the traffic, with traffic classified into the links.

Transparent – VLAN tags are not altered

Single – refers to the number of VLAN tags in the frame. "Single" modes prohibit user-side VLAN tags, and add just one tag, ensuring that frames meet strict IEEE specifications for having at most one VLAN tag, which is necessary to interoperate with some equipment that cannot support stacked VLAN tags.

Double – The domain adds a VLAN tag to any user-side tag which may be present, stacking multiple VLAN tags in one frame. The user frame might not actually be tagged, in which case there would not actually be two VLAN tags in the frame. Similarly, the user-side frame might start with multiple tags, in which case the frame in the core network would have more than two tags.

A-2-6 Bridge Mode Setting

Rules represent programmable actions taken by the look-up engine in response to specific conditions, such as some fields within a frame having a value in specified range. Filtering rules can remove packets from the data stream, while classification rules can select queues, links, and priority handling of a frame. The OLT and ONU also have the ability to add, remove, or modify VLAN tags within frames.

All of the VLAN modes discussed below are the result of programming the lookup engines appropriately.

Firmware translates requests for link switching modes from the host CPU (further referred to as *host*) into detailed lookup engine rules.

Each link at the OLT may be individually provisioned for a particular switching mode, which affects the traffic switching decisions made by the EPON nodes in the upstream and downstream directions. Except when noted otherwise, any or all switching modes may be in use on a single OLT simultaneously.

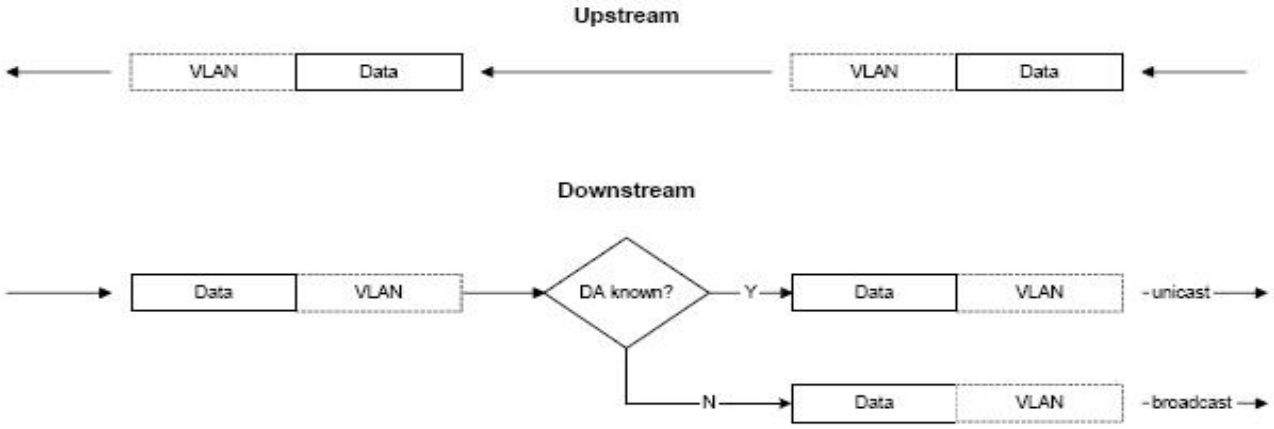
Simple Bridge

An 802.1D learns locations of stations connected to it by examining the sources Media Access Control (MAC) addresses of incoming frames. For each incoming frame, the bridge makes a forwarding decision by consulting its table of previously learned addresses. If the destination MAC address is found in the table, the bridge forwards the frame to the port associated with the given MAC address. If the MAC address cannot be found in the table, the frame will be "flooded" to all ports except the port from which the frame has arrived. This behavior will generate large amount of frames that are flooded to multiple ports. In an access network which serves non-cooperative users, this may result in private information being delivered to non-authorized users.

OLT modifies this default bridge behavior to reduce the amount of flooded traffic. In simple bridged mode, the OLT behaves like a bridge; however it distinguishes two types of ports: network-side ports and user-side ports. Network-side ports connect the OLT to upstream devices such as edge routers or switches. User-side ports are the ports that correspond to individual LLIDs. The simple bridging mode may be configured for dynamic learning look-up table. Upstream frames on the Simple Bridge may have VLAN tags, which are ignored by the system, but

CENTRAL DE SERVIÇOS AO CLIENTE
0800 412100

downstream frames with VLAN tags are dropped. The Simple Bridged mode would be used for an application that might use an ordinary Ethernet bridge.



Upstream Simple Bridge Mode	
Source MAC Address	**Bridging Action**
Unicast	Learn SA; Forward
Multicast	Forward
Broadcast	Forward

Downstream Simple Bridge Mode		
VLAN Tag	**Destination MAC Address**	**Bridging Action**
No	Learned	Forward To Link
No	Unlearned	Flood (Forward on broadcast link)
Yes	N/A	Drop

Transparent VLAN

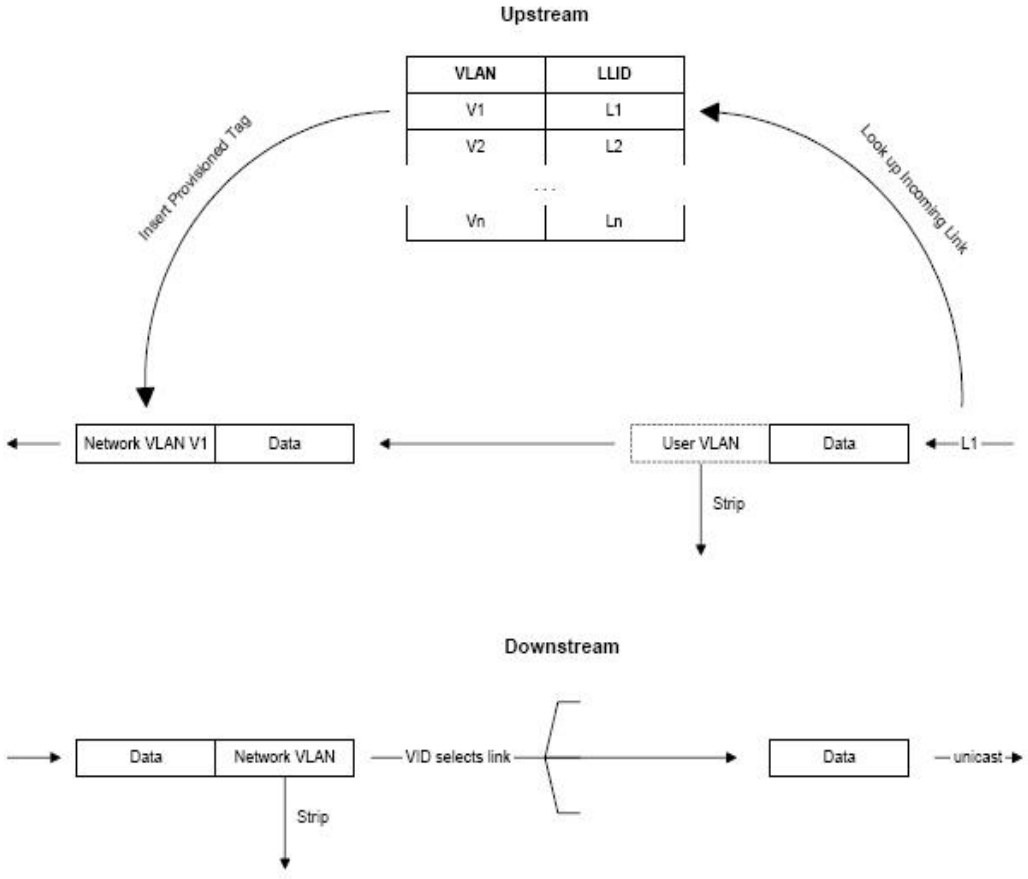
Transparent VLAN mode preserves VLAN tags in all forwarded frames. This mode is well suited to application in which the uniqueness of VLAN tags used by subscribers can be guaranteed; for example, when VLAN tag values are provisioned by the network operator . This might also be accomplished by provisioning filtering/classification rules on the ONU, or another device in the equipment chain.

Downstream Explanation

The Host software may provision up to 63 VLAN tags per link configured in transparent VLAN mode. When a tagged downstream frame arrives at the OLT's Uplink port, the OLT will attempt to match the tag carried by the frame against those provisioned by the Host. If the VID identifies a link provisioned in Transparent VLAN then that frame will be forwarded without modification to the associated link. All untagged downstream frames are discarded by the OLT.

Upstream Explanation

Since downstream bridging decisions are based exclusively on VID the SAs of upstream frames are not learned. All upstream frames arriving on links provisioned in Transparent VLAN will be forwarded as long as at least one VID is provisioned in the upstream direction. The provisioned upstream VIDs are not enforced by the OLT. (That is, a frame with an unprovisioned VID would be not be discarded.) We recommends adding ONU filter rules to enforce the set of possible upstream VIDs if necessary in the application (that is, if uncontrolled user equipment is generating the VIDs).



CENTRAL DE SERVIÇOS AO CLIENTE
0800 412100

Upstream Dedicated Single VLAN	
VLAN Tag Present	**Bridging Action**
Yes	Strip tag; Add provisioned tag; Forward
No	Add provisioned tag; Forward

Downstream Dedicated Single VLAN
Bridging Action
Strip tag; Forward on link (based on VID only)

Dedicated Single VLAN

Dedicated Single VLAN is so named because it strips a user-supplied VLAN tag, if any, before adding a network-provisioned VLAN tag. Unlike Transparent VLAN mode, Dedicated Single VLAN allows the network operator secure control over the VLAN tags injected into the core network. Nesting frames inside multiple layers of VLAN tags is now widely supported by Ethernet products. However, this capability is not part of the IEEE 802.1 standard. For this reason Dedicated Single VLAN has been provided to facilitate interoperability with some older equipment.

Upstream Explanation

When a tagged upstream frame arrives on a link configured in Dedicated Single VLAN the tag is stripped before forwarding. It should be noted that in the case that an upstream frame has more than 1 VLAN tag, only the outermost tag (the tag closest to the L2 SA field) will be stripped. Untagged upstream frames are simply forwarded.

Downstream Explanation

When a tagged downstream frame matching a link provisioned in Dedicated Single VLAN is received by the OLT's uplink port the tag is first striped before forwarding the frame to the link. Untagged downstream frames are discarded by the OLT.

Upstream Dedicated Single VLAN	
VLAN Tag Present	**Bridging Action**
Yes	Strip tag; Add provisioned tag; Forward
No	Add provisioned tag; Forward

Downstream Dedicated Single VLAN
Bridging Action
Strip tag; Forward on link (based on VID only)

Dedicated Double VLAN

Dedicated Double VLAN is so named in contrast to single VLAN mode because it preserves user-supplied VLAN tags. Thus, frames on the network side of the OLT may have two (or perhaps more) VLAN tags, one supplied by the network at the OLT, and others by the customer. The outermost is provisioned by the network, allowing control over switching and traffic engineering, while nested tags are preserved for those customers, that require their own VLAN tag scheme. Upstream, a tag is added by the OLT; downstream, the tag is removed before the frame is forwarded to the customer.

Upstream Dedicated Double VLAN	
VLAN Tag Present	**Bridging Action**
Yes	Add Provisioned Tag; Forward
No	Add Provisioned Tag; Forward

Downstream Dedicated Double VLAN
Bridging Action
Strip Tag; Forward on VLAN (based on VID only)

CENTRAL DE SERVIÇOS AO CLIENTE
0800 412100

Shared VLAN

Shared VLANs work like virtual bridges to segment the PON into multiple broadcast domains, each of which might have 1 or more associated links. One possible use of shared VLAN is to segment the PON based on service class; for instance one shared VLAN might be used to serve voice traffic while another could be dedicated to data. A link is added to a shared VLAN by first configuring the link for Shared VLAN mode and then provisioning a VLAN tag. All links configured in Shared VLAN mode with the same provisioned VLAN ID are said to be members of the same shared VLAN multicast group (not to be confused with an IGMP multicast group). Each shared VLAN has a broadcast channel that isolates the broadcast traffic of group members from that of other links. Filtering and classification rules on the OLT and ONU may be used to provide additional security.

There is no bound on the number of links that may be provisioned in a shared VLAN mode. However, it is important to note that no two links with the same destination UNI port may belong to the same shared VLAN. This restriction doesn't represent a significant limitation; as such a configuration is illogical.

Upstream Shared VLAN	
Source Mac	**Bridging Action**
Unicast	Learn SA; Add provisioned tag; Forward
Multicast	Add provisioned tag; Forward
Broadcast	Add provisioned tag; Forward

Downstream Shared VLAN	
Destination MAC	**Bridging Action**
Learned	Strip Tag; Forward on link (based on L2 DA + VID)
Unlearned	Strip Tag; Broadcast on VLAN (base on VID only) **

Double Shared VLAN

This mode is similar to Shared VLAN mode. However, in Double Tagged Shared VLAN mode, the tag on the frame coming upstream from the ONU is not stripped. The network tag is added to the frame, and any existing tags are untouched.

Priority VLAN

The *Priority VLAN* mode uses the VID carried by the downstream frame to select a particular ONU and the 802.1p priority (VLAN CoS) field to select a particular link of that ONU. Optionally the IPv4 ToS field may be used to select the link (the decision is made based on a personality flash parameter). This mode allows mapping of customer-side priority information, such as the IP Precedence / TOS field, into individual links on the PON, where service contracts can be enforced on each class of service. On the network side, the classes of service are mapped to VLAN priority values.

Note: Only links belonging to the same ONU may use the same VID values

In the downstream direction, switching is performed in two stages. The VID is used to select a group of links (an ONU), and the priority field is used to select the appropriate link within that group. This selection may be made based on a single priority value or a contiguous inclusive range of priority values.

Note: If IPv4 TOS is used then one link should be provisioned to allow non-IP (non-ToS) frames to be transmitted. One and only one link should be used for this purpose. This link is usually the lowest priority link, probably dedicated to data communications.

In the upstream direction, the link on which the frame arrived is used to select a VLAN Tag (provisioned *VID* and *Upstream CoS* value). Upstream user tags will be stripped prior to forwarding similar to dedicated Single VLAN mode. Note that though a range of priority values may be used downstream, upstream one and only one priority field value may be used to determine the VLAN.

Upstream Priority VLAN	
VLAN Tag Present	**Bridging Action**
Yes	Strip Tag; Add Provisioned Tag; Forward
No	Add Provisioned Tag; Forward

Downstream Priority VLAN
Bridging Action
Strip Tag; Forward on link (based on VID + Priority Value)

CENTRAL DE SERVIÇOS AO CLIENTE
0800 412100

Priority Shared VLAN

Priority Shared VLAN mode is similar to Shared VLAN mode except that as with Priority VLAN mode all bits of the VLAN tag may be used to specify a VLAN. Thus the VID is used to select a group of ONUs and the 802.1p priority field (CoS) is used to select a particular subset of links associated with that set of ONUs. Optionally IPv4 ToS may be used in favor of VLAN CoS, the selection is made by provisioning a personality parameter in the OLT's personality flash file. Note that, just like Priority VLAN mode, the downstream broadcast domain is identified by a combination of *VID* and an inclusive range of upstream priority field values such as [0, 4]. Except where noted the restrictions for Priority Shared VLAN is the same as that of Shared VLAN.

The main benefit of Priority VLAN over Shared VLAN is that downstream bridging decisions may be made by IPv4 ToS. Additionally, this mode conserves VLAN address space by using priority values as part of the domain identification. A modicum of flexibility is gained by allowing bridging decisions to be made on ranges of values. The typical application of this mode would be the same as that of Shared VLAN.

NOTE: When links are provisioned for Priority Shared VLAN the user has to ensure that for each VLAN all the priority ranges (0-7) are provisioned. The user cannot leave any holes. For example if there are links which are provisioned for Priority Shared VLAN with the following data

Link Id	VLAN	Min Priority	Max Priority
1	10	0	3
2	10	4	6

then traffic on VLAN 10 will not be allowed since VLAN = 10, Priority = 7 has not been provisioned for any link. The following tables show a complete provisioning where there are no holes in the priority.

Link Id	VLAN	Min Priority	Max Priority
1	10	0	3
2	10	4	7

Link Id	VLAN	Min Priority	Max Priority
1	10	0	3
2	10	4	6
3	10	7	7

Downstream Priority Shared VLAN (Switch on ToS)			
ToS in Range	**Tx-Non-ToS-Frames**	**L2 DA Learned**	**Bridging Action**
Yes	N/A	Yes	Strip Tag; Forward (Based on DA + VID + ToS)
		No	Strip Tag; Broadcast on VLAN (Based on VID + ToS)
No	Yes	Yes	Strip Tag; Forward (Based on DA + VID)
		No	Strip Tag; Broadcast on VLAN (Based on VID) **
	No	N/A	Drop

Downstream Priority Shared VLAN (Switch on CoS)			
CoS in Range	**Tx-Non-ToS-Frames**	**L2 DA Learned**	**Bridging Action**
Yes	N/A	Yes	Strip Tag; Forward (DA + VID + CoS)
		No	Strip Tag; Broadcast on VLAN (VID + CoS) **
No	N/A	N/A	Drop

Upstream Priority Shared VLAN	
VLAN Tag Present	**Bridging Action**
Yes	Strip Tag; Add Provisioned Tag (VID + Upstream CoS); Forward
No	Add Provisioned Tag; Forward

Transparent Priority Shared VLAN

This mode is the exactly the same as Priority Shared VLAN in terms of provisioning & classification of traffic in both the directions. The only difference is that this mode does not STRIP VLAN in the down stream direction. It uses the VLAN for classification but does not remove it. Down stream frames transmitted out of the UNI ports still have a TAG since they are not stripped at the OLT. Any restrictions that apply to Priority Shared VLAN apply to this mode as well.

CENTRAL DE SERVIÇOS AO CLIENTE
0800 412100

Transparent Shared VLAN with Broadcast

Transparent Shared VLANs with Broadcast (**TSVB**) work like virtual bridges to segment the PON into multiple broadcast domains, each of which might have 1 or more associated links. A link is added to a TSVB by first configuring the link for TSVB mode and then provisioning a VLAN tag. All links configured in TSVB mode with the same provisioned VLAN ID are said to be members of the same TSVB group. All links provisioned for TSVB share broadcast channel which is the same channel used by Simple Bridge for Flooding. Filtering and classification rules on the OLT and ONU may be used to provide additional security. In this mode the VLAN in the frame is preserved in both directions.

There is no bound on the number of links that may be provisioned in a TSVB mode. However, it is important to note that no two links with the same destination UNI port may belong to the same shared domain. This restriction does not represent a significant limitation; as such a configuration is illogical.

Upstream Explanation

When an upstream frame (tagged or untagged) is received on a link associated with a Transparent shared VLAN with Broadcast, the OLT forwards the frame to the core network without modifying the frame. The OLT learns the SA of upstream frames as dynamic MAC address filtering rules for downstream bridging.

Downstream Explanation

When a tagged downstream frame identifying a TSVB group is received by the OLT's Uplink port, the tag is preserved and the frame is forwarded. Downstream frames, for which the DA is unknown, are broadcast on the regular broadcast link (sent with Broadcast LLID). These frames will be forwarded by every link belonging to the TSVB group and by other links that normally forward broadcast traffic(like simple bridged links). If the DA is known, the frame is forwarded to only the associated link.

Upstream Transparent Shared VLAN with Broadcast	
Source Mac	**Bridging Action**
Unicast	Learn SA; Preserve tag; Forward
Multicast	Preserve tag ,Forward
Broadcast	Preserve tag,Forward

Downstream Transparent Shared VLAN with Broadcast	
Destination MAC	**Bridging Action**
Learned	Preserve Tag; Forward on link (based on L2 DA + VID)
Unlearned	**Preserve Tag; Broadcast (Uses Broadcast LLID)**

Priority Remapping Option

Some VLAN modes have an option to set priority values in the network-side VLAN tag based on priority fields from user frames. Modes with this option include the Dedicated Single, Dedicated Double, and Shared VLAN mode. Rather than using a host-provisioned priority value for the network-side VLAN tag added in these modes, the Priority Remapping option uses the VID specified by the host, but determines the 802.1p priority field values based on the user frame input.

This option uses either one or two priority fields as a source of the priority for the frame. These fields are known as "Priority A" and "Priority B". The actual field in the frame used for each field is programmable.

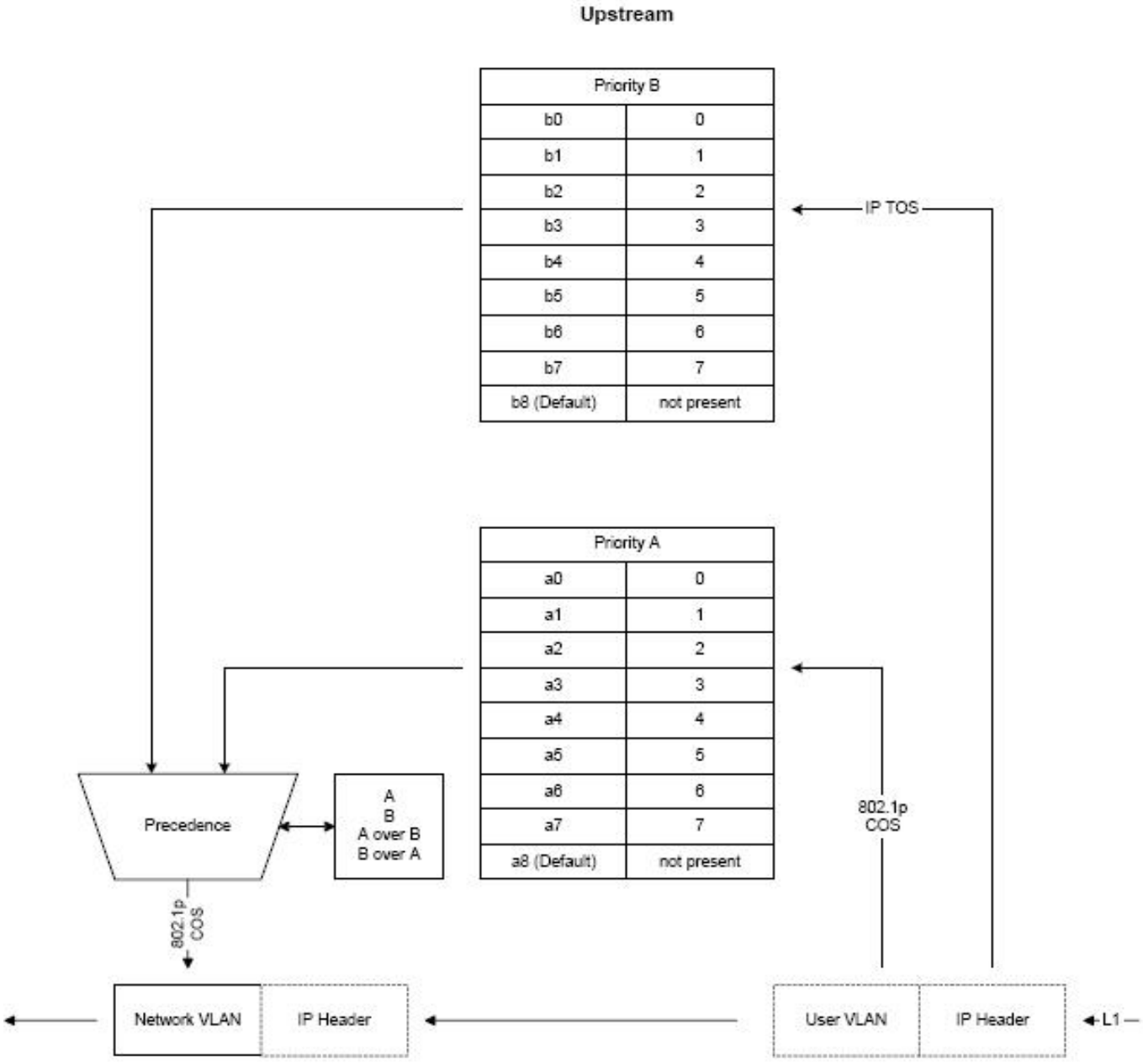
As an example, this discussion assumes that Priority B is the 802.1p Class of Service bits in the VLAN tag (the "COS"; 3-bits), and that Priority A is the IP Precedence or Type of Service field in the IP header (the "TOS"; 3-bits).

Consider the case where only Priority B is used, and the COS field is selected. A frame arriving upstream on a link will have a VLAN tag with some priority value included. These three bits representing an input priority value are used to look up an output priority value in a table for Priority B. A three-bit value is produced, and the network side VLAN tag inserted by the OLT will have this value as the priority field in the tag. Note that if the table is programmed such that the output value is the same as the input index, the output priority of the VLAN tag will be the same as the input priority on the tag the user supplies. Hence, the name "priority remapping" for this option. The output values in the table can be programmed to other values,however, so there can be an arbitrary mapping from input priority to output priority. This feature can be useful, for instance, to invert a priority scheme. (Some schemes use lower numbers to represent higher priority traffic; others use higher numbers to represent higher priority traffic).

If the input frame has no VLAN tag, there is no input priority to use to index into the table. In such a case, a programmed default priority value is used.

As mentioned above, it is possible to configure two input priority fields, A and B, to use to determine the network-side priority. Each priority field has its own lookup table, and each lookup produces a possible value for the priority in the network VLAN tag. This mode includes an *A/B Precedence* parameter to choose which priority to use if both values are present. If only one of the two fields is present in the frame, that value will be used. If neither field is present in the frame, the default value will be supplied. The A/B Precedence parameter can be set to select the priority from field A only, field B only, to prefer the value from Field A to that from Field B, or to prefer Field B over Field A.

CENTRAL DE SERVIÇOS AO CLIENTE
0800 412100


Upstream
Priority B
b0 0
b1 1
b2 2
b3 3
b4 4
b5 5
b6 6
b7 7
b8 (Default) not present
IP TOS
Priority A
a0 0
a1 1
a2 2
a3 3
a4 4
a5 5
a6 6
a7 7
a8 (Default) not present
Precedence
A
B
A over B
B over A
802.1p
COS
802.1p
COS
Network VLAN
IP Header
User VLAN
IP Header
L1

A-3 EPON Data Traffic Encryption

The EPON system encrypts downstream traffic using a unique key for each LLID. The encryption is done in hardware at the OLT and the ONU contains hardware to decrypt the traffic.

The OLT hardware executes Advanced Encryption Standard (AES) on 128-bit block sizes. It uses 128-bit keys to encrypt the data. Cipher Feedback Mode (CFB) is used to provide a more robust encryption than ECB and OFB modes.

Every downstream LLID will be configured as a secured (encrypted) or non-secured channel.Each secured LLID has a unique encryption key. ONUs with multiple customer ports mapped to multiple LLIDs will have separate keys.

There are actually two keys associated with each LLID, active and standby. There is a 2-bit field in the EPON frame preamble which determines two things:

1) is the frame encrypted, and

2) which key was used to encrypt the frame.

The receiving ONU decrypts the frame based on information received in the preamble.

Each ONU generates a key for each LLID. A configurable timer determines when to generate a new key. When the OLT receives a new key, it is written into the standby key register for that LLID. On the next frame sent,the OLT toggles the active and standby keys, and starts sending with the new key.

The receiving ONU detects switch over from the preamble header and begins decrypting on the new key. If switch over does not occur within a configurable timer value (independent from the key generation timer) the ONU will generate another new key and resend the new key message. The key generation timer defaults to 10 minutes, and the switchover timer defaults to 100 ms.

CENTRAL DE SERVIÇOS AO CLIENTE
0800 412100

A-4 IP Multicast On EPON

The implementation of multicast on OLT and ONU is designed to efficiently distribute multicast frames, and prevent wasting network bandwidth by sending only the frames that are being used by subscribers and only supports IGMP Versions 1 and 2.

A-4-1 IGMP Snooping and Proxying

Snooping refers to observing a packet as it passes through a device in order to eavesdrop on a conversation between two network stations other than the snooping device. Although the intermediate device may use the information for its own ends, the protocol between client and server remains unaffected by the snooping.

A *proxy* is a network station that handles a protocol in place of another station. The client station may even be unaware that a proxy exists. Unlike snooping, proxying may change the traffic patterns for the proxied protocol.

Multicast IGMP snooping is implemented in firmware that runs on the ONU.

Multicast IGMP Proxy is implemented in firmware that runs on the OLT.

When OLT IGMP Proxy is enabled, the OLT forwards multicast frames to the broadcast LLID depending on lookup tables for current Groups based upon Joins received for those Groups.

One chief advantage of a PON architecture for delivery of multicast traffic is that all downstream frames naturally reach all ONUs. This is the so-called "single copy broadcast" property. For any number of downstream subscribers, only one copy of a particular IP multicast frame will be present on the PON.

Each ONU filters frames received on the broadcast LLID and only forwards frames with multicast MAC addresses entered in its lookup tables. The lookup tables are updated based on results of snooping.

When OLT IGMP Proxy is disabled the OLT forwards all multicast frames to the broadcast LLID. Each ONU filters frames received on the broadcast LLID and only forwards frames with multicast MAC addresses entered in its lookup tables.

A-4-2 OLT IGMP PROXY

The proxy acts on behalf of all terminals on the EPON span, aggregating multiple IGMP Reports from EPON terminals to single Reports in response to Queries from the multicast server (if a group is needed by any terminal in the network). This produces advantages of quicker response time to the report, as well as reduced traffic into the core network and the multicast server, increasing the number of terminals a single server can support. The OLT IGMP Proxy terminates queries from upstream servers,and generates Reports based on its current forwarding state. To maintain this state, the OLT Proxy generates its own Queries to downstream Hosts. Similarly, the OLT proxy terminates all Leave messages from downstream Hosts. When the OLT proxy decides to stop forwarding a group, because no downstream Host needs the group any longer, the proxy will generate a Leave message upstream to the multicast server.

1)Startup Query Operation

The purpose of Startup Queries is for the OLT proxy to discover the initial state of the IGMP network.Startup Queries are simply General Queries sent out when the proxy first starts operation. After initialization, the IGMP Proxy function at the OLT begins to issue Startup Queries. The OLT will issue *Startup Query Count* messages at intervals equal to the *Startup Query Interval*. These values are typically provisioned to generate Startup Queries at higher frequency than the General Queries discussed below.

2)General Query Operation

Upon completion of the Startup Query sequence, the OLT will begin issuing General Queries at a provisioned interval. General Queries are the only means of detection of hosts that leave the network in IGMP version 1. In addition, IGMPv2 devices may not always get a chance to send a Leave message, or the message may be lost. Under all versions of IGMP, General Queries are useful for periodically auditing the network so that the OLT and ONUs can stop forwarding groups that are no longer needed.

The General Query messages are generated at intervals equal to the *Query Interval*(default = 125 s). The *Robustness* value (default = 2)determines the number of General Queries that will be sent for each audit cycle. A count is maintained for each active group which begins at the Robustness value and is decremented for each Query that remains unanswered within the *Maximum Response Time*. When the group counter reaches zero, the OLT stops forwarding the group. Thus, the *Robustness* value is the number of retries for the query, and is used to guard against dropping a group prematurely due to packet loss in the network.

The OLT supports an additional feature, called Implicit Leave, to accelerate detection of hosts that have departed the network. A General Query should receive a Report message for all groups that are currently needed downstream. A host that departs the network (perhaps by being powered down) will not respond. But per RFC2236, the group will be forwarded for the duration of the full interval of *General Query Interval* * *Robustness*. Since the

CENTRAL DE SERVIÇOS AO CLIENTE
0800 412100

General Query Interval is typically relatively long, this means abandoned groups can persist for some time. Using the default values from the standard, it would take 125 s + 10 s, to remove an abandoned group.

To accelerate detection of abandoned groups, when the OLT receives no response for an active group, it issues a Group Specific query for the group or groups that fail to respond to the General Query. Lack of a report triggers a rapid cycle much like that begun when a Leave message is received. Instead of waiting for the entire General Query timeout cycle to finish, the OLT begins a series of Group-Specific Queries for the groups that fail to report. This series waits for the *Last Member Query Maximum Response Time* (default 1 second) and repeats for the *Last Member Query Count*.

This feature accelerates group removal without sacrificing robustness to lost messages. Using default values, an abandoned group would be detected within 10s + 2 * 1s, or 12 seconds after the initial General Query that detects a failure to report.

When Implicit Leave Detection is in use, there is little need for a large *Robustness* value. Protection against lost replies to General Queries is provided by the Last Member Query sequence and the Last Member Query Count.

3)Join Operation

If the OLT receives an unsolicited Report (Join) message from one of the hosts, and this host is the first host requesting a given multicast group, the OLT will add this group address to its forwarding table and will generate its own IGMP Join message to the Querier.

If the joining host is not the first host in the EPON segment to join given multicast group, i.e., if the requested multicast group address already exists in the forwarding table, then the group is already being forwarded onto the PON. The OLT will discard the Join message and perform no further action.

4)Leave Operation

Per IGMP specifications(see [RFC1112] and [RFC2236]), when an IGMP Leave message is received, the OLT sends Group-Specific Query messages to confirm that no members remain on that Group before it is removed. The Group-Specific Queries sent after a Leave are called Last Member Queries. This functionality is controlled by *Last Member Query Count* and *Last Member Query Interval* IGMP parameters; *Last Member Query Count* specifies the number of Group-Specific Queries sent and the *Last Member Query Interval* specifies the interval at which the messages are sent. If no IGMP Report is received by the OLT before these Group-Specific (or "Last Member") Queries expire, then that group is removed.

Due to the point-to-multipoint nature of the PON, the OLT may receive Reports from many hosts. Receipt of the Report from the first host to respond is sufficient information for the OLT to know that it must continue to forward the group. However, unlike a point-to-point switch, the OLT must continue to generate the full count of Last

Member Queries in the event that some other host did not see a Query or that its reply is lost. The OLT will always generate *Last Member Query Count* messages after a leave, continuing even after it receives the first Report.

5)IGMP SLA

The IGMP SLA represents a collection of parameters that controls multicast SLA settings, such as minimum/maximum guaranteed bandwidth, delay sensitivity, and maximum burst size. The IGMP SLA parameters have no effect when the IGMP Proxy is disabled.

A-4-3 ONU IGMP Snooping

1) Join Operation

Receiving a Report on a UNI port will add that port to the multicast group identified in the Group Address field of the IGMP message. ONU snooping does not alter or influence in any way the IGMP message exchange.ONU forwards IGMP packets to the OLT, even if the required multicast channel is already being forwarded by the OLT to other ONUs.

2)Query Operation

When the ONU snoops a Query message from the OLT, it starts a query timer and forwards the Query message to all ports, even if no hosts behind the port have joined the given multicast group yet. If the Query message has IGMP v1 format , the query timer is set to 10 seconds, per RFC1112. If an IGMP v2 Query is received, the timer is set to the value in the Maximum Response time field of the Query message.

When the ONU snoops the Query message, it forwards the Query to all hosts and sets a timer according to the timeout value in that message, multiplied by the retry count for that query type. If no Report is received for that group by the time the timer elapses, the ONU will remove that group from the forwarding table.

3)Leave Operation

In most cases, the ONU simply forwards the Leave message to the OLT without taking any action.Removal of the group is based upon failure to respond to a query message generated by the OLT or network Querier. The exception is when the ONU *Fast Leave* feature is enabled.

When Fast Leave is enabled(Last Member Query Count=0), forwarding of a group stops immediately upon reception of a Leave message for that group. Note that this feature is only useful if it is known that exactly one device downstream of the ONU can join a group. If more than one device is attached to the ONU port though a switch or hub, then the first one to leave would stop traffic to both devices. Typically, Fast Leave is used on switches in the middle of an IGMP network, where the next downstream node is a switch that is also running IGMP proxy software.

CENTRAL DE SERVIÇOS AO CLIENTE
0800 412100

IGMP Proxy with Vlan

The OLT IGMP proxy behavior can be changed if tagged IP multicast traffic play a role in the EPON network.

1)Vlan-ignored Proxy

It is the default mode. tagged IP multicast traffic and tagged IGMP packet are treated as if they are not vlan-tagged.

2) limited functionality for tagged multicast traffic

This mode can be achieved by setting the number of IGMP VLANs in the IGMP VLAN provisioning message to zero and then using the VLAN tag field in the IGMP proxy settings message.

The VLAN tag option in the IGMP management changed the IGMP proxy behavior in two ways.

a) If a VLAN tag was provisioned the OLT would strip the VLAN tag off of a multicast IP frame downstream.

b) The OLT would generate upstream reports with the provisioned VLAN tag.

3) Multi-VLAN IGMP Proxy

The OLT IGMP proxy can be configured to proxy multicast traffic for up to 8 separate VLANs. For each of the traffic streams the IGMP proxy also supports different tagging modes depending on the incoming network VLAN tag and the desired EPON VLAN tag. Note that in each configuration the OLT will only process the frames it has been provisioned to process. For example, if the OLT were provisioned to process multicast frames on VLAN 8 it would ignore multicast frames on all other VLANs as well as untagged frames. In this way the IGMP proxy ensures that it does not modify traffic that it has not be provisioned to effect.The OLT can strip, add, translate, or leave VLAN tags intact as required by a provider.

Network VID is used on frames on the uplink side of the OLT, including Reports generated by the proxy. The EPON VID is used downstream of the OLT, including Queries generated by the proxy. The network and EPON VIDs may be programmed to the same or to different values, with the following results.

Network VID	EPON VID	Result
0	0	Untagged frames are passed through the OLT
0	non-zero	Tags are added to untagged downstream IPMC
non-zero	0	Tags are stripped from downstream IPMC
non-zero	equal to Network VID	Tags are retained through the OLT
non-zero	different from Network VID	Tags on IPMC are removed and replaced with a new value

A-4-4 IGMP CAC

The IGMP CAC (Call Admission Control) feature allows the OLT to enforce bandwidth limits for IP multicast traffic on each IGMP VLAN. Each IGMP VLAN can be provisioned with a minimum guaranteed and maximum allowed bandwidth. The minimum guaranteed bandwidth is the amount of bandwidth that the OLT will reserve for a particular IGMP VLAN. The maximum allowed bandwidth is the amount of bandwidth that the OLT will allow to be used on an IGMP VLAN before it starts rejecting joins on the basis that the VLAN is using too much bandwidth.

For bandwidth between min and max the OLT uses a first come first serve (FCFS) bandwidth pool that is shared among all VLANs. For example, an IGMP VLAN provisioned with a bandwidth minimum of 10 Mbps and a maximum of 20 Mbps would use the first 10 Mbps worth of joins to fill the minimum guaranteed bandwidth pool. It would then allow joins from 10 to 20 Mbps if the first come first serve pool had free bandwidth.

In addition to allowing the IGMP proxy to maintain bandwidth limits the CAC algorithm also facilitates traffic smoothing by providing the OLT with information about the amount of bandwidth that a particular group requires. See *" FIFO selection and shaping ".*

When the OLT receives a join for a group it attempts to ascertain how much bandwidth the group is likely to consume. The OLT finds this information in either the CAC database which allows the bandwidth for each group that the OLT is likely to see to be provisioned or through the default per channel bandwidth for the VLAN. If the OLT resolves zero as the amount of bandwidth that a group takes it will reject the join.

Once the OLT has resolved the amount of bandwidth needed by a group it checks to see how much bandwidth is currently in use for that group. It then makes a decision based on the amount of traffic currently being forwarded

CENTRAL DE SERVIÇOS AO CLIENTE
0800 412100

for a VID.If the join will fit into the min pool for the VLAN it will be put there, otherwise if there isn't room in the min pool but there is room in the FCFS pool it will be allocated there. If there is no room the join will be refused and a statistic will be incremented. Using this functionality the host can ensure that at no time will the OLT try to forward more that a provisioned amount of IP Multicast traffic on a per VID and global basis. For this feature to function correctly the host must provision accurate values for group bandwidths.

Note that if the host does not desire to use the CAC functionality to limit bandwidth it can:

1) The default bandwidth for groups to be one.

2) The minimum guaranteed bandwidth for a group to be zero.

3) The maximum bandwidth to be greater than or equal to the maximum number of joins expected for that VLAN.

These three bits of provisioning will cause the OLT CAC function to always allow joins. Note that for all VLAN groups the CAC functionality should either be used or not used in order for FIFO selection to function correctly.

A-4-5 FIFO selection and shaping

The OLT IGMP proxy uses a number of FIFOs (set within the IGMP proxy configuration) to shape traffic. The OLT shaping will redirect the traffic through a FIFO to spread the traffic out over time to make it less bursty. It is allowed to change the number of FIFOs that the OLT will direct traffic into as well as the SLA that will be applied to all FIFOs.

The OLT does this using a set of FIFOs each of which has a SLA setting applied. The SLA limits the rate at which traffic can drain from the FIFO causing the traffic to be shaped. For each group that is forwarded by the OLT it must choose a FIFO to put the traffic into. This is accomplished using the following algorithm:

Given the amount of bandwidth that a group requires and the amount of free bandwidth in the set of IGMP FIFOs:

Find the FIFO with the least bandwidth in use and allocate the group there as long as there is enough room in the FIFO for the amount of bandwidth required by the gorup. The maximum amount of traffic let into the FIFO is defined by the IGMP SLA. For example, if the SLA was set to 100 Mbps max, the OLT CAC algorithm would not put more than 100 Mbps of multicast traffic into that FIFO.

Note that given the implementation of the IGMP FIFO choosing algorithm it would be wise for the host to provision more room in its FIFOs than the maximum amount of bandwidth possible from the CAC algorithm. This is to ensure that as long as there is CAC bandwidth available that the FIFO choosing algorithm will be able to find a FIFO with enough free space.

A-5 SLA & DBA

Overview

The EPON system enforce Service Level Agreement (SLA) by using scheduling, shaping, and DBA(Dynamic Bandwidth Allocation) .

An SLA may be configured for each LLID (Logical Link ID) independently in the upstream and downstream direction. The SLA specifies the following four parameters:

1.Minimum Guaranteed Bandwidth

2.Maximum Allowable Bandwidth

3.Burst Size:

The Shaper allows for "bursts" of data to be sent up to MaxBurst bytes.Data transmit rate may be higher than SLA Maximum bandwidth when this burst occurr(in the point of view of a very very short period of time),but over the long run the output of data is limited to a constant rate.

4.Delay Tolerance:

The per link SLA for (either upstream or downstream) has an implicit Qos priority class declaration:

.Sensitive(priority level 0):

Maximum Allowable Bandwidth= Minimum Guaranteed Bandwidth

sensitive mode=SENSITIVE

.Tolerant(priority level 1):

Minimum Guaranteed Bandwidth>0

sensitive mode=TOLERANT

.Best Effort(priority level 2):

Minimum Guaranteed Bandwidth=0

sensitive mode=TOLERANT

The OLT bridges a point-to-point Gigabit Ethernet Network link to a point-to-multipoint Gigabit Ethernet PON. The downstream traffic may have small oversubscription due to additional MPCP and OAM overhead added by the OLT to the EPON side. To handle the possibility of oversubscription downstream, the OLT performs scheduling and shaping of downstream traffic on a per-queue basis. Because each queue is mapped to an LLID, the scheduling

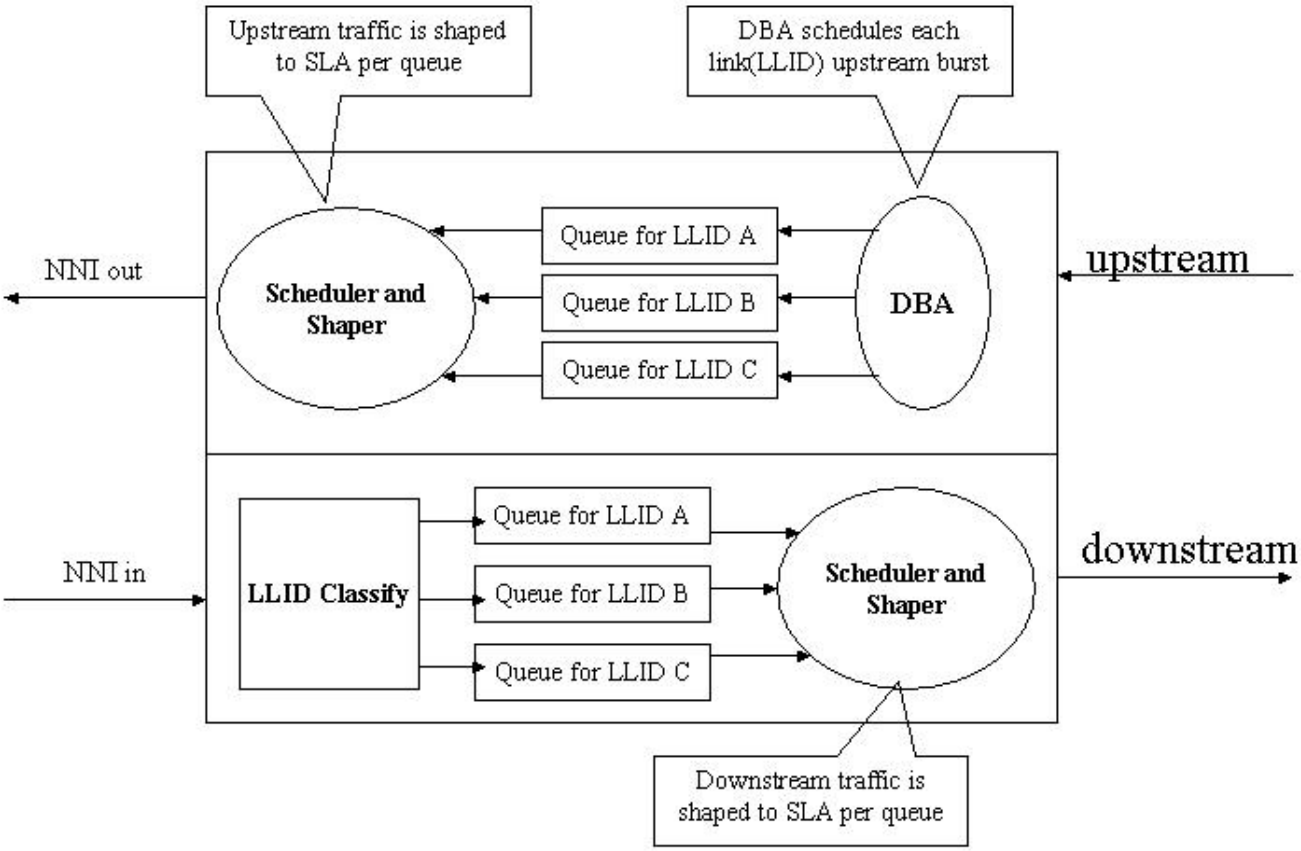
CENTRAL DE SERVIÇOS AO CLIENTE
0800 412100

and shaping is performed per LLID. Shaping and scheduling in the downstream enforce this service contract defined by the SLA.

Traffic shaping ensures that the Maximum Allowable Bandwidth and Burst Size are not exceeded on a per SLA basis.

In the upstream direction, there is potential for oversubscription with many logical links with potential aggregate capacity greater than 1 Gbps contending for aggregate upstream link capacity of 1 Gbps. The OLT uses a WHRR (Weighted Hierarchal Round Robin) DBA scheduling algorithm in the upstream bandwidth allocation. This scheduling system sends bandwidth grants to the ONUs using GATE messages to the ONUs. The DBA uses queue length status received from ONU Report messages, along with the SLA parameters, to calculate bandwidth allocation.

In the upstream direction,each LLID (logical link) also has its own queue.The DBA determines when blocks of data can be transmitted upstream and input to the OLT queues. The scheduler/shaper determines when blocks of data can be transmitted out of the queues to the NNI.



Packet Classification

Classification is performed at each ingress point. Specific fields in the frames such as 802.1Q, DiffServ(TOS),Layer 2/3 Address, or Layer 4 ports can be used to map traffic into Link Layer IDs and Service Level Agreements.

On the downstream, the OLT classifies each packet using the downstream Lookup Engine(packets are classified into a logical link queue downstream according to LLID's specific Bridge Mode).The downstream scheduler/shaper controls the transmission of frames from these queues to meet each SLA.

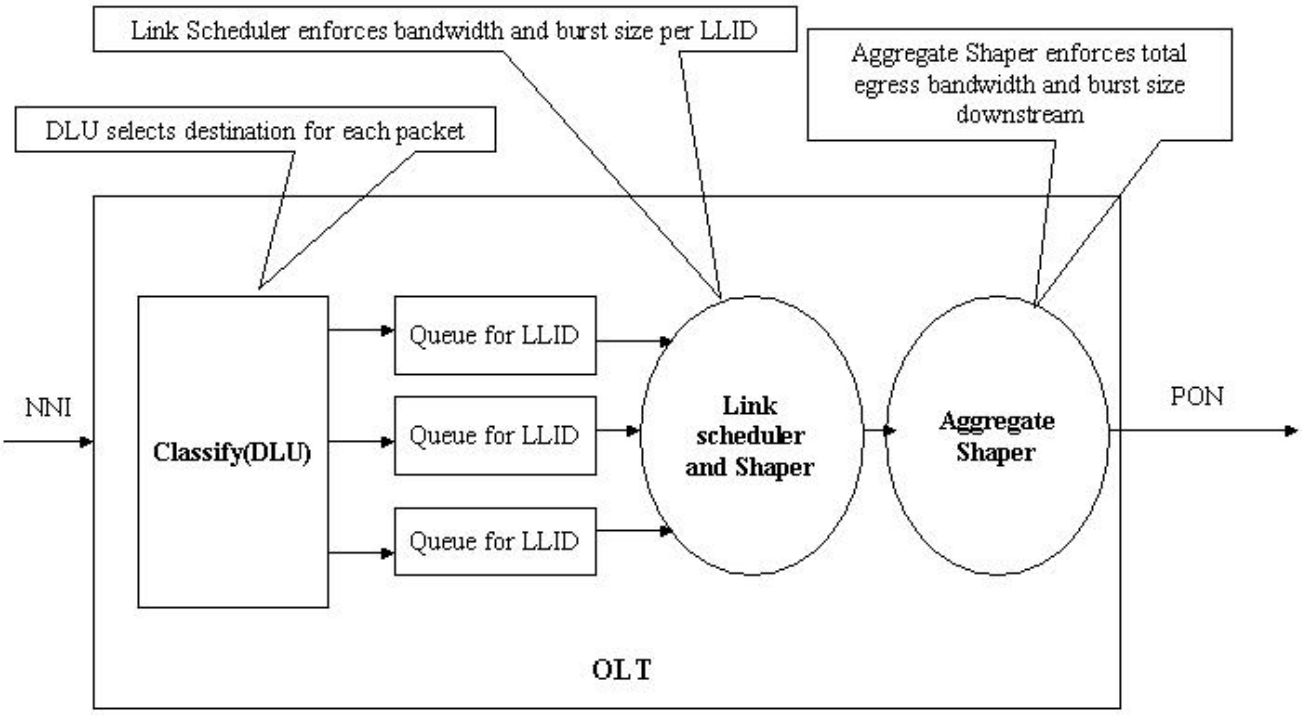
On upstream traffic, the ONU places each frame into one of the ONU queues. The OLT firmware reserves one or more queues for control OAM and MPCP frames. Non-reserved queues may be mapped to an LLID. It is possible for multiple queues to correspond to a single LLID. Lower number queues have strict priority over higher number queues.

CENTRAL DE SERVIÇOS AO CLIENTE
0800 412100

Downstream Traffic Management

In the downstream direction, there may be oversubscription on the PON link due to additional OAM and MPCP frames consume bandwidth.

To mitigate the effects of downstream oversubscription, each downstream flow is assigned an SLA. Using a downstream SLA per link guarantees the service contract for each link by providing isolation between links.



Upstream Traffic Management

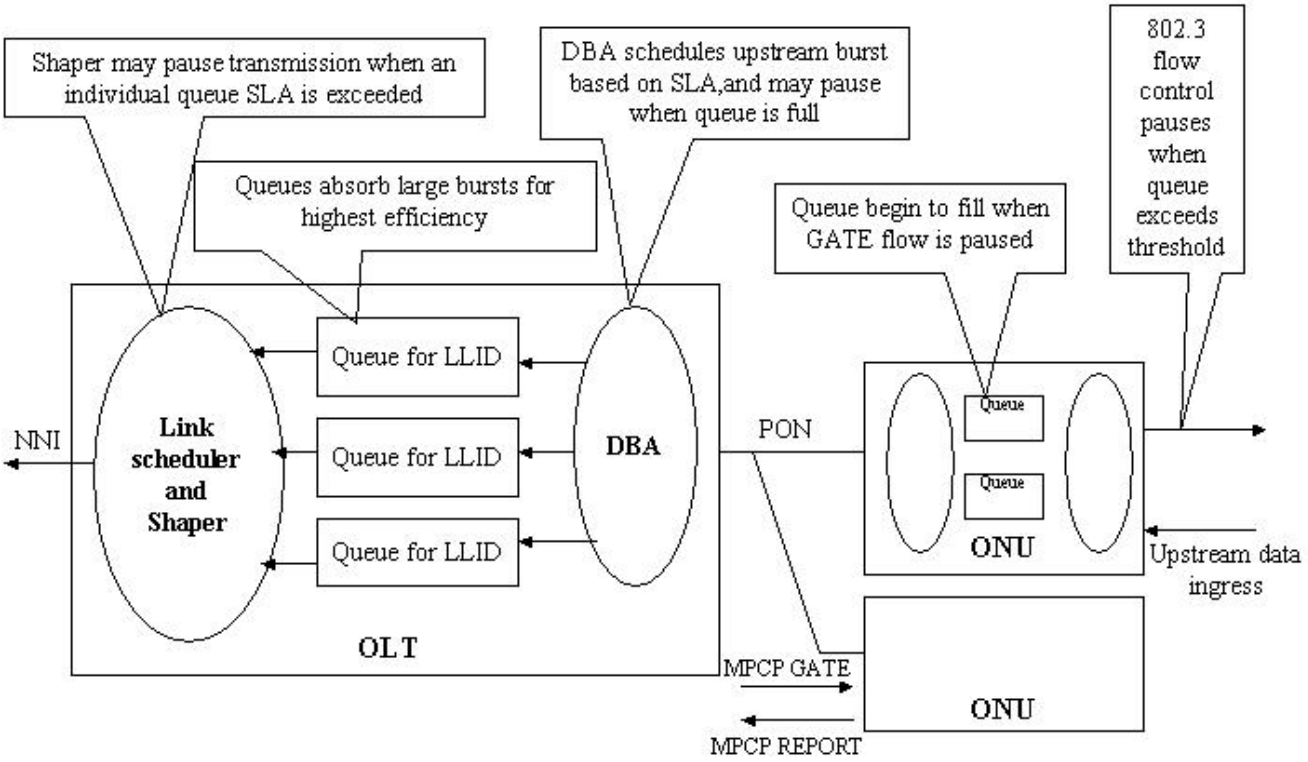
In the upstream direction, there are multiple ingress points contending for shared upstream bandwidth. The DBA is responsible for allocating bandwidth on a per-LLID basis. In addition to the DBA, there is a Scheduler/Shaper function applied at the output of the queues. The shaper counts the number of bytes transmitted, compares with the SLA provisioned values, and halts transmission when a queue exceeds the allocated amount. The shaper sends a halt signal to the scheduler on a per-queue basis.

The scheduler guarantees the minimum bandwidth per SLA, while the shaper guarantees the maximum bandwidth and burst size are not exceeded.

When traffic on a given LLID has exceeded the service contract, the LLID must temporarily pause transmission.The shaper measures the traffic, and calculates the pause such that the service contract is adhered to. The effect of

this is that the queues begin to fill, and a pause frame is sent to the user port. This mechanism is designed such that there are no loss of packets.

On the upstream,OLT an aggregate shaper to limit the total egress bandwidth. This may be useful, for example, if the OLT NNI was connected to shared Ethernet switch with limited capacity. The aggregate shaper could be applied to the NNI to ensure that upstream traffic will never exceed an allowed amount.Likewise, the aggregate shaper may be configured in the downstream direction.



CENTRAL DE SERVIÇOS AO CLIENTE
0800 412100

Provisioning the DBA

Ensuring that the sum of the Minimum Guaranteed Bandwidth of the SLAs does not exceed the actual link capacity. DBA engine requires the following variables to be provisioned:

Please also refer to user manual section 3-2-6(OLT Dynamic Bandwidth Allocation).

1. Tokens for LLIDs:

Dba Tokens represents the number of tokens allocated to each LLID. The number of tokens is computed by considering the bandwidth requirements of the LLID per grant cycle.

2. Tokens for Drop Downs:

Drop Down weight is used for the DBA engine to decide how many grant of bytes to give to logical links in the next lower priority level chances to transmit upstream in a DBA scheduling cycle.

3. Polling Rate for priority levels:

DBA issues a Polling Grant periodically if ONU doesn't report queue data.

This occurs when the time since an LLID of an ONU was last granted exceeds the polling interval.Polling Grant assures that every idle logical link can have a chance to report the size of data that buffered in it upstream queue.Polling intervals are assigned per priority level. All LLIDs in a given priority level have the same polling interval.

The DBA can guarantee a minimum bandwidth is allocated to an LLID during oversubscription. This calculation is done by assuming the worst case scenario; all LLIDs have data to transfer and the offered load exceeds 1 Gbps.

Let's consider the below configuration with 128 LLIDs.

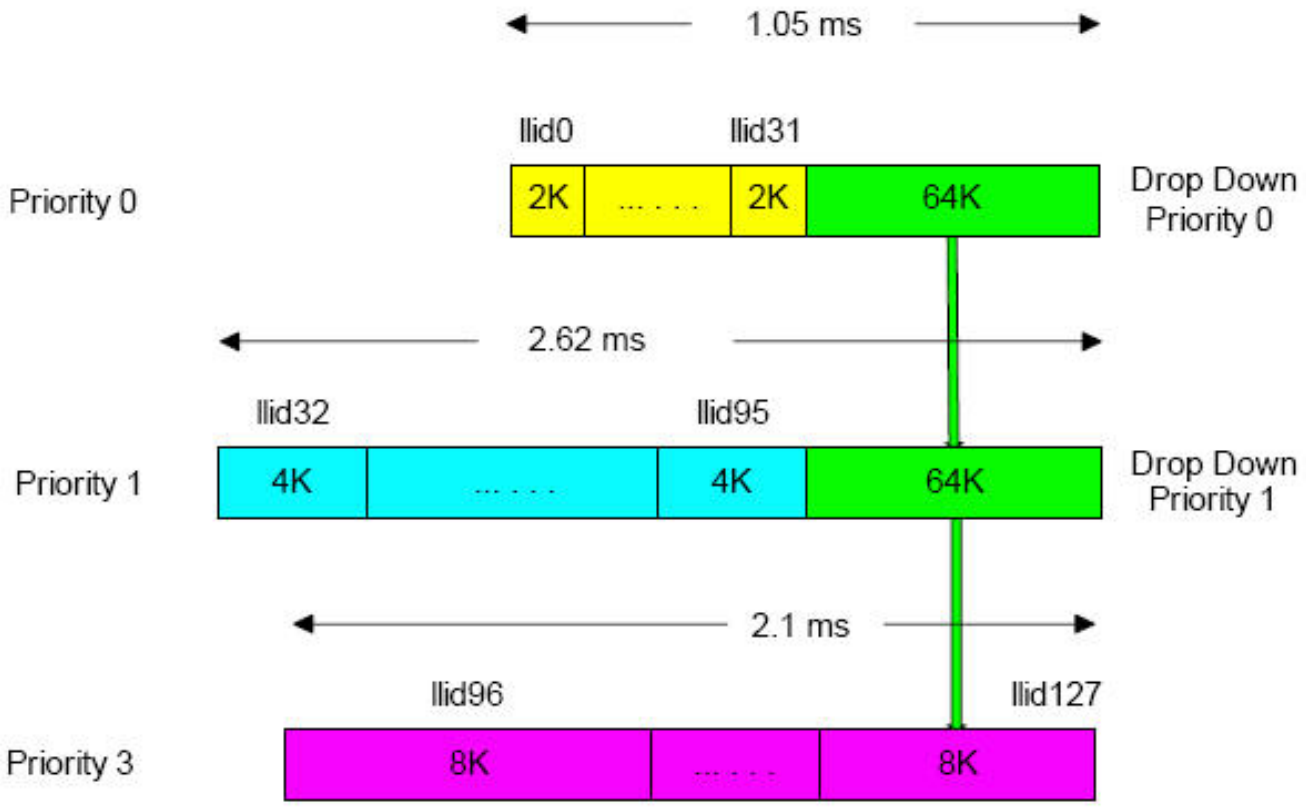
Priority 0 (sensitive) - 32 LLIDs

Priority 1 (tolerant) - 64 LLIDs

Priority 2 (best effort) - 32 LLIDs

For simplicity, all LLIDs have 2K tokens in priority 0, have 4K tokens in Priority 1, and have 8K tokens in Priority 2.

Such a configuration may be used in a 32 ONU system, where each ONU has four LLIDs. The four LLIDs are distributed as follows; one sensitive, two tolerant, and one best effort.



Let us denote the cycle time for a priority X to be Pri_LengthX.

Pri_Length0 = (2K*32+64K)Byte=1048576 bit(ns) = 1.05 ms

Pri_Length1 = (4K*64+64K)Byte=2621140 bit(ns) = 2.62 ms

Pri_Length2 = (8K*32)Byte=2097152 bit(ns) = 2.10 ms

For priority 0 an element is granted once every 1.05 ms. Lets introduce a new term called Priority_Cycle. This defines how long an LLID must wait in between two consecutive grants. For priority 0 the Priority_Cycle0 = Pri_Length0.

We can find the bandwidth as follows:

llidBand0(x) = Burst_Size0x/Priority_Cycle0

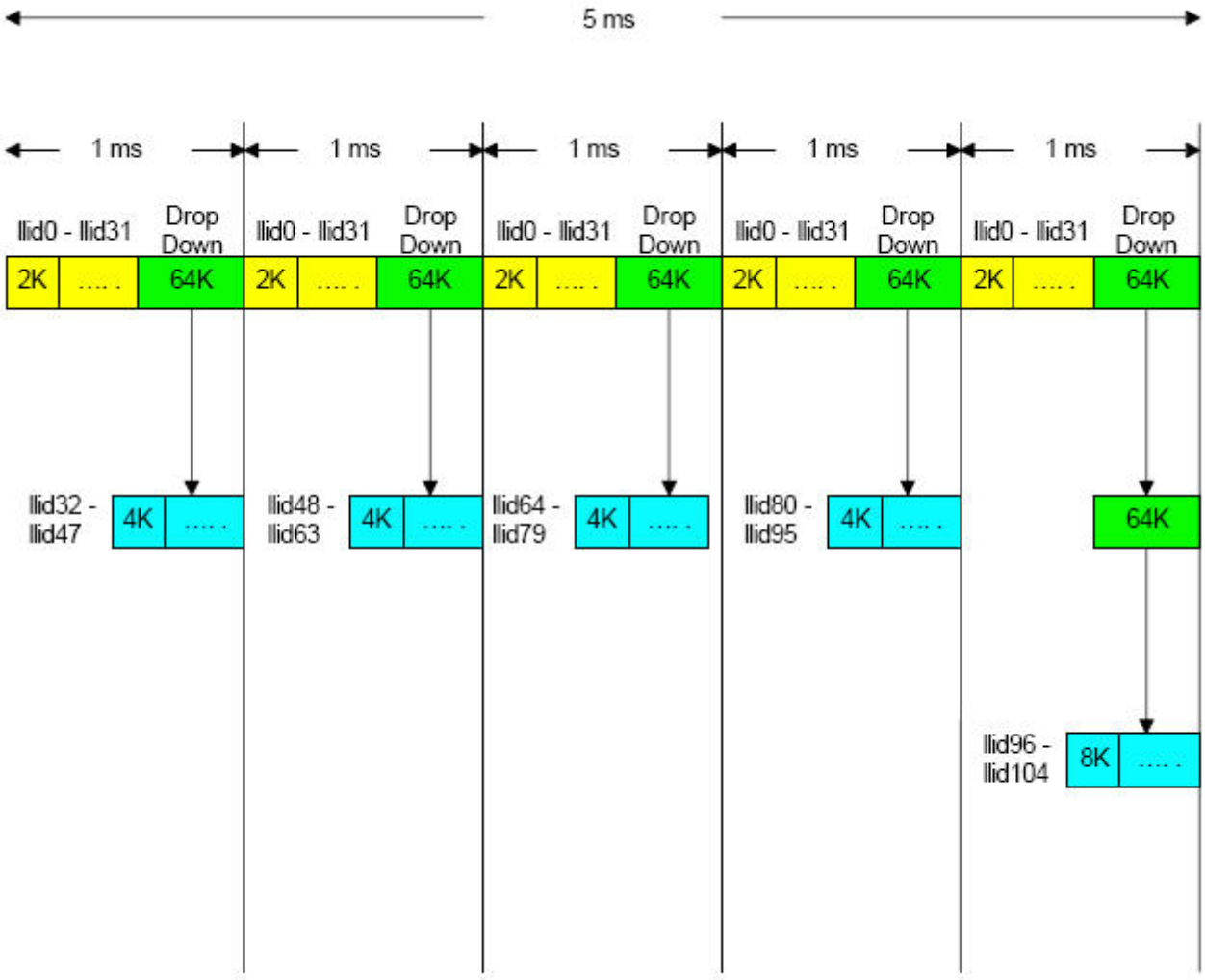
= (2048 – Report_Size) bytes/1.05 ms

= 1964 bytes/1.05 ms = 15 Mbps

The calculation is more complicated for lower priority levels.

CENTRAL DE SERVIÇOS AO CLIENTE
0800 412100

For every cycle of priority 0 there is 64 Kbytes (524 us) reserved for lower priorities. Therefore, a relationship can be created between Priority 0 and Priority 1 as follows. For every full traversal of Priority 1, there were 5 traversals of priority 0.



So for the case of Priority 1, Priority_Cycle1 is not equal to Priority_Length1. The relationship is a bit more elaborate.

Priority_Length1/Drop_Down0 = 2.62 ms/525 us= 5

Priority_Cycle1 = Priority_Cycle0* (Priority_Length1/Drop_Down0)=5*1.05 ms

Similarly for Priority 2:

Priority_Cycle2 = Priority_Cycle1*(Priority_Length2/Drop_Down1)

=Priority_Cycle0*(Priority_Length1/Drop_Down0)*(Priority_Length2/Drop_Down1)

=1.05ms*5*4

In the above example we have about 15 Mbps allocated to each priority 0 LLID due to us using 2K Bytes of tokens. If less than 15 Mbps is desired for the LLID, the bandwidth can be further constricted via the shaper setting(SLA Maximum Allowable Bandwidth).

2K Bytes is normally the minimum value that should be used. It is possible to assign 1K Byte tokens. However, if frames arrive on that are in excess of 1K bytes, inefficiencies will occur in the granting process. Such a configuration can only be used if the probability of frames less than 2K bytes arriving is small.

Calculating and Provisioning the Polling Rate

As discussed previously, the polling rate is the minimum frequency in which an LLID receives grants. The polling rate must be set to a value >= Priority_CycleN.

Each priority level is assigned a polling rate.

All LLIDs in a priority have the same polling rate.Substantial bandwidth will be wasted if the polling rate is set to a value less than the respective Priority_Cycle. By setting the polling rate greater than the Priority_Cycle we ensure the LLID does not receive a data grant and a poll grant in the same cycle. Within a Priority_Cycle the LLID should receive only one of the two. Inproper setting of the polling rate can reduce overall bandwidth.

CENTRAL DE SERVIÇOS AO CLIENTE
0800 412100

Appendix B – Technical Specification

Model Description

16-slot managed EPON converter chassis for modular EPON Media converter with redundant AC Power or redundant –48VDC Power.

Converter Chassis Model	Power Supply Configuration	DC Output	Slots
FK-C16-RAC	Two AC 100/240V Power Module w/ Redundancy	400W @+12V	16

Note:

- The OLT modules are ordered by model number and with a separate package.
- The slide-in modules and converter chassis should be supplied only by the same manufacturer/vender. Both converter and chassis rack are built to match each other at dimensions, power bus/receptacle and power safety, etc.

Capacity : 16 Slots for modular Media converter
Management : SNMP and web-base via in-band LAN port or local serial CLI
Power supply : Hot-swap redundant, high reliability/safety

Redundant Power Requirement:

AC Power Input:	
Voltage:	100/240VAC
Frequency:	50~60Hz
Dissipation:	200W maximum (each Power Module)

Ambient Temperature : 0° to 40°C
Humidity : 5% to 90%
Dimensions : 132(H) × 440(W) × 336.5(L) mm
Weight : 8.52kg (without power)
: 10.56 kg (includes 2 x AC power)

Complies with FCC Part 15 Class A & CE Mark Approval

Management Features:

- Provides SNMP and Web management for the unit power status, module type and port link status of each media converter module.
- Management from anywhere and any platform using a web browser.
- Easy-to-use point and click user interface.
- Photographic quality interface to configure and monitor the device.
- In-band and out-of-band remote telnet management
- Local CLI management via RS232 port.
- TFTP Software Upgrade.

Management Specification:

The functions of management related to components/devices are as follows:

LAN Port	The LAN port for in-band management
Console Port	The console port for out-of-band management
Management LED	The management module is working

The managed Media converter module/device can be managed by:

- Direct CLI connection over an RS232 cable
- Web browser software from Internet or Intranet over TCP/IP network
- Telnet software over TCP/IP network
- SNMP management over TCP/IP network

CENTRAL DE SERVIÇOS AO CLIENTE
0800 412100

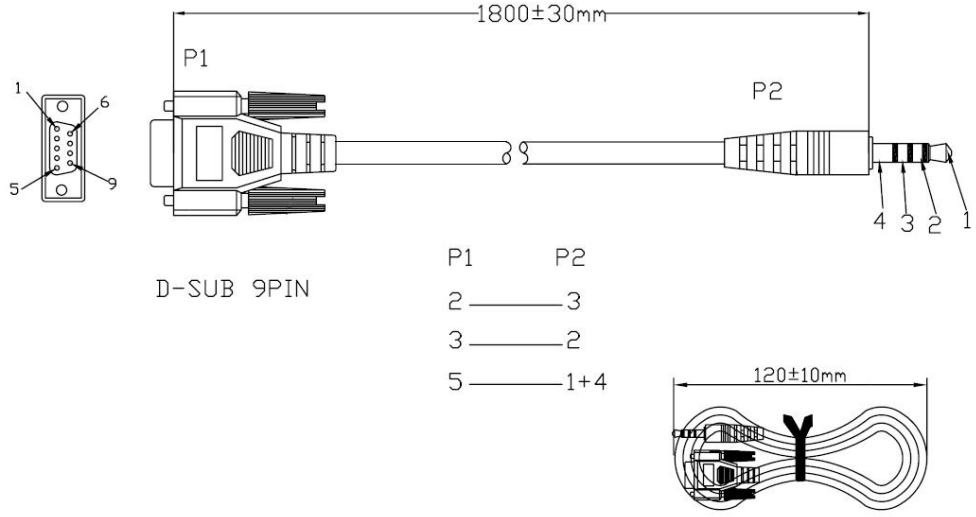
Appendix C – RS-232 Serial Cable Specification

The DB-9 to Ear-Phone jack cable is used for connecting a terminal or terminal emulator to the Media Converter Chassis Management Module to access the command-line interface.

The table below shows the pin assignments for the RS-232 cable.

Function	Mnemonic	Pin
Carrier	CD	1
Receive Data	RXD	2
Transmit Data	TXD	3
Data Terminal Ready	DTR	4
Signal Ground	GND	5
Data Set Ready	DSR	6
Request To Send	RTS	7
Clear To Send	CTS	8

DB9 Pin to Ear-Phone Jack RS-232 Serial Cable Specification:



BRASIL
MATRIZ E CENTRO DE PRODUÇÃO CURITIBA - PR
R. Hasdrubal Bellegard, 820
Cidade Industrial - CEP: 81460-120 - PR
tel.: (55 41) 3341-4200 - Fax: (55 41) 3341-4141

ESCRITÓRIO NACIONAL DE VENDAS
SÃO PAULO - SP
Av. das Nações Unidas, 11.633 - 14º andar
Ed. Brasilinterpart - CEP: 04578-901 - SP
tel.: (55 11) 5501-5711 - Fax: (55 11) 5501-5757

VENDAS / REGIONAIS
BELO HORIZONTE - MG
Av. Antônio Abrahão Caran, 430 - Cj. 104
Bairro São José - CEP: 31275-000 - MG
tel.: (55 31) 3443-3502 / Fax: (55 31) 3441-0257

BRASILIA - DF
SCN, Quadra 02 Bl. A - Ed. Corporate Financial Center, 5º - Salas 502/ 503/ 504
CEP: 70712-900 - DF
tel: (55 61) 3329-6036
Cel.: (55 61) 8117-8530

PORTO ALEGRE - RS
Caixa Postal 5531
CEP: 90410-007 - RS
Cel.: (55 51) 8206-5609

RECIFE - PE
Caixa Postal 7440
CEP: 50630-971 - PE
tel.: (55 81) 9601-3484

RIO DE JANEIRO - RJ
Av. Rio Branco, 01 - 12º andar
CEP: 20090-003 - RJ
tel.: (55 21) 2588-8056
Cel.: (55 21) 8118-2288

SALVADOR - BA
Caixa Postal 6991
CEP: 41810-971 - BA
Cel.: (55 71) 9205-9877

ARGENTINA
ESCRITÓRIO
BUENOS AIRES
Moreno 850 - Piso 13A
Cód. Postal C1091AAR – Ciudad Autónoma de Buenos Aires
tel.: (54-11) 4331-2572

CENTRO DE PRODUCÇÃO
Ruta Nacional 2, km 37,5 - Centro Industrial Ruta 2
Berazalegui - Província de Buenos Aires